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REPORT

ON

PUBLIC WORKS ADMINISTRATION

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COMMITTEE ON PLAN PROJECTS

(Buildings Projects Team)

NEW DELHI

November, 1962

COMPOSITION OF THE BUILDINGS PROJECTS TEAM

Leader

Shri S. K. Patil, Minister for Food and Agriculture.

Members

Shri Sarup Singh, I. S. E. (Retd.), formerly Director, National Buildings Organisation.

Shri N. G. Dewan, I. S. E., Chief Engineer, Central Public Works Department.

Maj. Gen. Harkirat Singh, Engineer-in-Chief, Army Head-quarters, New Delhi.

Dr. Eng. A. Carbone, Consulting Engineer, Calcutta.[*]

Shri C. P. Malik, Director, National Buildings Organisation.[†]

Member-Secretary

Shri T. S. Vedagiri, Superintending Engineer.

Shri P. S. Krishnaswamy, Superintending Engineer & Deputy Secretary.

Shri Lakshmi Narain Gupta, Assistant Accounts Officer.

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[*] Shri N. V. Modak was appointed as Member in place of Dr. A. Carbone who expired in October, 1962.

[†] Shri C. B. Patel took over on 1st October, 1962 in place of Shri C. P. Malik transferred.

MINISTER FOR FOOD AND AGRICULTURE

New Delhi, November 6, 1962

MY DEAR LAL BAHADUR,

I have great pleasure in forwarding the report of the Buildings Projects Team on Public Works Administration. You will recall that this was one of the major items of the terms of reference given to the Team. Our studies of other types of schemes, such as, multi-storeyed buildings, residential buildings etc. have also revealed the short-comings of the present pattern and procedure of public works administration and have emphasised the need for a thorough study of the problem in all its aspects. Considering the importance of this problem and the bearing it has on the successful implementation of Plan programmes, we constituted a high level Panel under the Chairmanship of Shri U. J. Bhatt, Chief Engineer and Joint Secretary, Public Works Department, Bombay (now Gujarat) to study this problem in detail and make comprehensive report. The Chief Engineers of Madras, Uttar Pradesh, and West Bengal, an Additional Chief Engineer from the Central Public Works Department and a senior officer of the Military Engineering Services were Members of the Panel. The Members of the Team have fully associated themselves with the work of the Panel.

The Panel visited a number of States, had discussions with the engineers, administrators and Ministers. They instituted a number of work study programmes in the Public Works Departments of the States as well as the Centre with a view to ascertaining the deficiencies in the procedure and the limiting factors which contribute to delay in the execution of works and increase in cost. Arising out of these detailed studies and investigations, the Panel has come to certain conclusions that the situation calls for radical changes in the procedure and set up of public works administration if plan programmes are to be executed with speed, economy and efficiency. With this end in view, they have made a number of recommendations which are spelt out in the report.

They have recommended changes in procedures for speeding up of progress of work at the stage of various approvals, such as administrative approval, technical sanction etc. With regard to contracts, the Panel has made a number of suggestions for making the conditions of contracts unambiguous and equitable. They also strongly recommended the abolition of the system of technical examination of works now prevalent in some departments and have sought to replace the same more effectively by strengthening of the public works organisation from within.

With regard to administrative set up, they have recommended the setting up of a Board of Engineers in each State Government for the purpose of effectively co-ordinating the technical activity in the State with a view to maximisation of resources and reduction in cost.

They have pointedly referred to the need for effecting unitary control over public works administration by making the Chief Engineer himself a Secretary or Additional Secretary to the Government.

They have also worked out a detailed schedule of powers for engineering Officers so as to effect uniformity and vest the engineering officers with adequate powers to deal with situations in an expeditious manner. Notable among other recommendations are those pertaining to simplification of stores and accounts procedure and arbitration and the creation of work study wings in each public works department for the purpose of continuously evaluating works and works procedure with a view to improvement.

You will agree that these recommendations are of far-reaching significance and merit serious consideration of Government if we have to get the best out of our public works organisations.

I take this opportunity to thanking the State Governments and Public Works Organisations for the co-operation they have extended to us in supplying information and for the facilities they have afforded for detailed studies and discussions. My special thanks are due to Shri U. J. Bhatt, Chairman of the Panel and other Members who have worked incessantly on this project for two years and produced this valuable document.

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Yours Sincerely,
S. K. PATIL.

SHRI LAL BAHADUR SHASTRI,
Minister for Home Affairs and
Chairman, Committee on Plan Projects,
New Delhi.

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INTRODUCTION

0.1. The Buildings Projects Team of the Committee on Plan Projects was constituted in March, 1957 in order to carry out evaluation of selected building projects and lay down norms and standards with a view to achieving economy in building construction costs on rational lines.

0.2. The following were the Team's terms of reference :

To begin with, the Team was to take up the following projects for evaluation :—

(i) Multi-storeyed office accommodation such as on King Edward and Queen Victoria Roads and some of the office buildings constructed by the C. P. W. D. outside Delhi.

(ii) Slum Clearance schemes of a few States.

(iii) Comparable building projects of 4 to 5 different States to be selected by the Leader of the Team in consultation with the Chairman, Committee on Plan Projects.

As a result of the evaluation of the above projects, the Team was to make suggestions on the following general questions :—

(i) Standardisation of technical requirements of similar types of buildings with a view to achieving the maximum economy in costs and scarce materials consistent with the utility and optimum life of the building.

(ii) Comparative study of rate structure and profit margins.

(iii) Organisational questions, especially the work load on each category of staff, and the principles on which it is computed.

(iv) Organisation of "technical audit" for the work of the Public Works Department, its functions and location *i.e.* within the P.W.D. or outside it.

(v) Methods of work relating to designing, planning and execution of projects, including any factors, that impede work and remedies for them.

0.3. This Team appointed various Panels consisting of specialists and the Panels have carried out extensive studies of multi-storeyed buildings, residential buildings, grains storages etc.

0.4. One factor that constantly emerged from these studies was the unsuitability of the existing P.W.D. set up both at the Centre and in the States to cope with the present large scale development works contemplated in the Five Year Plans.

0.5. As the terms of reference of the Buildings Projects Team had already envisaged a study of Public Works Administration, a Panel consisting of the following was set up in October, 1960 for this purpose :—

1. Shri U. J. Bhatt, Chief Engineer (B. & R.) & Joint Secretary, Govt. of Gujarat, Ahmedabad.	Chairman
2. ,, Jagdish Prasad, Chief Engineer (B. & R.) Government of U. P., Lucknow.	Member
3. ,, J. G. Abraham, Chief Engineer (Genl.), Govt. of Madras, Madras.	Member
4. ,, J. K. Banerjee, Chief Engineer (Works & Bldgs.), Govt. of West Bengal, Calcutta.	Member
5. ,, B. K. Guha, Addl. Chief Engineer, Central P. W. D., New Delhi.	Member
6. Col. G. Benjamin, Dy. Director (Designs), E-in-C's Branch, Army Hqrs., New Delhi.	Member
7. Shri T. S. Vedagiri, Superintending Engineer, Buildings Projects Team.	Member-Secretary

0.6. The Planning Commission, in their Third Five Year Plan, have recognised the urgent need for economy in construction costs and emphasised the need for reviewing the working of various Public Works Departments so that they are suitably equipped to carry out the construction programme envisaged in the Plans with greater efficiency, economy and speed than at present.

0.7. Out of a total outlay of Rs. 4,600 crores in the Second Five Year Plan, construction activity accounted for Rs. 2,000 crores, out of which over Rs. 800 crores were spent on buildings alone. For the Third Five Year Plan which envisages an outlay of Rs. 7,500 crores, the figures will be correspondingly higher. The dominant role of the Public Works Departments in the country in the implementation of the Five Year Plans is thus evident.

0.8. We are conscious of the complaints against the Public Works Departments that are from time to time voiced by the Public who are naturally unaware of the check posts through which schemes have to pass. It should be appreciated that certain checks are necessary in Public undertakings, because of their accountability to the public. At the same time, means should not be confused with ends. Procedure must not be permitted to stifle the objectives. Our objectives have changed. The rules and regulations governing these departments were framed when construction activity was of a limited order. With the advent of Independence and the launching of Five Year Plans, there has been a tremendous increase in this activity (*see* Appendix I). Not only has the quantum of construction gone up but the variety of works also has increased. Qualitatively, as well as quantitatively, the task of the Engineers has assumed vast proportions. The procedural codes on the other hand have remained more or less static; in fact, they have been made more rigid resulting in increased paper work. The systems of administrative and financial controls as they exist today are not conducive to the exercise of responsibility by senior engineers nor do they encourage initiative and progressive thinking in young engineers.

0.9. Attempts have been made in the past, in certain departments to examine their systems of working with a view to reform. Mention may be made here of the Kasturbhai Lalbhai Committee appointed by the Ministry of Works, Housing & Supply to review working of C.P.W.D. and C.W. & P.C., Review and Estimates Committees of the M.E.S. and Administrative Reforms Committees of Andhra Pradesh and Mysore. These Committees made important recommendations for changes within the existing frame-work of the Departments concerned but little has so far been done on an all-India basis.

0.10. In the present context of extensive developmental activity throughout the country, it is essential to consider these problems from an all-India angle. Further the need for cost reduction assumes great importance in view of the magnitude of the plan projects and the circumscribed resources. The role that Engineers can play towards cost reduction is a vital one.

0.11. Leaders of the country have laid emphasis on political, cultural and emotional integration. We are of the view that technical integration is no less important. In fact, it is imperative. We are very happy that one of our recommendations, namely, revival of the Indian Service of Engineers, that has been under consideration separately by the Government, has finally been accepted in principle. This is indeed a welcome decision. It will be conducive to the evolution of common technical standards and a healthy growth in the professional stature of our engineers.

0.12. Our studies had necessarily to be in great detail and in many cases work study techniques have been adopted in clarifying the numerous problems. We visited some of the States, *viz.*, West Bengal, Orissa, Andhra Pradesh, Mysore, Gujarat and the Punjab and held extensive discussions with the Chief Engineers as well as Chief Ministers and Ministers incharge of P.W.D. of the States. We also invited the representatives of Bharat Sewak Samaj and Builders' Association of India and National Buildings Construction Corporation to put forward their views regarding public co-operative agencies and the contract systems.

0.13. An important impression that emerged from all these discussions was that a deep sense of frustration prevails in the minds of engineers and builders in the country. They consider that the existing procedure is so viscid that they are unable to give of their best to the job. This alarming state of affairs does not augur well for the success of our Plans. Although some Chief Engineers have been successful in their work, this has been due, mainly, to an accord of individuals. No enterprise can, however, be dependent for success on a delicate balance of personalities.

0.14. Besides the visits to the States, the Panel also collected valuable information from the States through personal contacts, detailed case studies and correspondence.

0.15. The Symposium organised in November, 1961 by the Institution of Engineers on the subject of "Economy and Efficiency of Engineering Enterprises in India" which was attended by leading engineers from all over the country, afforded us the opportunity of learning at first hand the views of engineers in general on this subject. It is gratifying to note that there was complete unanimity of opinion regarding the necessity for radical changes in the public works administration.

0.16. It is in the context of this background that we have approached the problem. We are convinced that the answer to the problem does not lie in enhancing a few powers here and there, or by making minor changes in the procedure—drastic and radical changes are called for. Our proposals to obtain this objective are contained in the following chapters.

0.17. We take this opportunity of thanking the various State Governments and Engineer Departments for the facilities afforded for detailed study and the cordiality and co-operation extended during our visits.

0.18. We cannot sufficiently thank Shri R. N. Vasudeva, Director, Organisation & Methods Division, Government of India and Secretary, Committee on Plan Projects for the interest he had evinced in the work of the Panel and for the valuable help he gave us in preparing the report. Our thanks are also due to Shri R. S. Chadda, Deputy Secretary, Committee on Plan Projects for his assistance in drafting.

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1. PLANNING OF WORKS

1.1. Need for Planning.—Proper planning is an essential pre-requisite for all works in order to ensure best utilisation of our resources. This assumes special significance in the context of the programme of development of the country envisaged in the Five Year Plans.

1.2. The conditions as they prevail, we feel, are neither conducive to economy nor efficiency. Engineers are called upon, at short notice, to carry out projects and that too not infrequently within impractical time limits. Failure to do so is looked upon as tardiness or inefficiency on their part. In consequence, the planning of projects suffer, the most economical results are not always achieved and funds have to be surrendered at a late stage. It must be appreciated that once the layout and designs of a project are finalised, the scope for economy in actual execution is of a limited nature. It is at the planning stage, that real economy can be achieved through adoption of norms and standards already spelt out or where necessary by carrying out work studies to determine functional requirements.

The necessity for devoting adequate time to planning cannot, therefore, be overemphasised.

1.3. Projects must be conceived well in advance of their implementation if engineers are to get adequate time for planning. In so far as projects in the Five Year Plans are concerned, we find that the details only become known at the commencement of the plan period; in consequence, the engineers have to hurriedly collect data and rush through the planning stage in order to show some expenditure in the first year of the plan. It is essential therefore that the outline of the Five Year Plans should be finalised at least one year before the commencement of the plan period. This would necessitate the proposals of the States being in the hands of the Planning Commission at least two years in advance. Only thus can it be ensured that projects are planned properly and arrangements made for the necessary resources in time.

Similarly, in the year to year programme for Plan Projects, the list of works should be finalised one year in advance. This would apply equally to non-Plan Projects.

1.4. Fixation of Priorities.—In regard to the programme of works, it is essential that firm priorities are laid down under each sub-head; for which purpose a Works Priority Committee should be set up in each State, where it does not already exist. The Chief Engineer should be closely associated with this Committee to enable him to assist the Ministries/Departments concerned in drawing up realistic budget demands and also to take preliminary action in assessing the requirements of land materials, equipment and manpower. This would also enable him to commence preliminary planning of priority projects. The planning of works in most States leaves a great deal to be desired. In one State, the Health Department made provision in the 1961-62 budget for a certain number of health centres to be constructed in various parts of the State. The Chief Engineer, who had not been consulted, became aware of this provision only after receipt of the printed budget. Enquiries from the Department revealed that a decision had yet to be taken regarding the location of a number of these centres whilst in a few cases land had still to be acquired for the purpose. In consequence, a large proportion of the work could not be executed during the year. In another Department in the same State, out of 41 works to be executed during 1961-62, only one had been administratively approved by June 61, and sites were available for only 8 works. It is not surprising that this results in heavy surrenders towards the end of the year. In the year 1960-61 a sum of Rs. 2.19 crores had been surrendered out of the allotment of Rs. 6.13 crores.

We, therefore, strongly recommend that no work should be included in the budget for a particular year unless it has been administratively approved at least six months before the commencement of that year, and that the demand for funds for works should only be made after consultation with the Chief Engineer. We further recommend that no provision in the budget for construction of any project should be made, unless land for the purpose is either available or has been acquired.

1.5. Budget year.—Another aspect of the budgeting system, which we consider affects the speed of works, is the budget year which commences from 1st of April. This is particularly applicable to new capital works and maintenance works. Under the prevailing system, the budget is voted in March and allotments reach the executive only during the month of April-May. Action is then taken to prepare contracts, order stores, etc. by which time the monsoon would have broken. Work, therefore, rarely commences before October, resulting in a six months' working season only.

This naturally leads to low expenditure in the early part of the financial year and rush of expenditure towards the end which in majority of cases is not conducive to efficiency. In certain other cases this leads to inevitable late surrenders making it practically impossible to divert the funds to more profitable uses elsewhere. With a view to ensuring a more even distribution of works throughout the year, we would suggest that the budget year commences from 1st of July. This, coupled with our earlier recommendations regarding budgeting and finalisation of works programme in advance, would definitely improve the situation. With the budget period commencing from 1st of July, the earlier part of the financial year, which is normally the monsoon season in the larger part of the country, can be utilised for planning. When once works are started soon after the monsoon period, they can be continued without break for about 9 months.

We appreciate the implications of this radical change, but would urge that our recommendation be given serious consideration.

1.6. Material Budgeting.—Another important aspect of planning to which little attention has been given in the past is material budgeting. It is not commonly appreciated that materials account for nearly two-thirds of the cost of works. In the absence of proper material budgeting there are frequent interruptions in the progress of works leading to extensions of time and other complications. Considering the magnitude of work envisaged in the Five Year Plans and the immense requirements of materials of all types, we consider that unless proper forecasts of materials are made, and suitable action taken to ensure their procurement in time, the implementation of our plans will be adversely affected.

Although some general forecasts, based on previous years' consumption, are being made in respect of major items such as steel, cement, coal, etc., no forecasting or planning is being done for other materials such as bricks, timber, AC products, pipes, etc., or, if it is being done, it is completely unco-ordinated.

Proposals from States for inclusion of projects in the Five Year Plans should, therefore, invariably be accompanied by detailed project-wise forecasts of materials, in short supply, and equipment required for construction work. For this purpose, it will be necessary to set up material budgeting cells in the States and Central Engineer Organisations. The work of these cells should be co-ordinated by a central cell in the Planning Commission which would be in a position to correlate overall requirements and availability of construction materials and equipment. The proposed procedure will make for realistic allotment of funds.

1.7. Apart from the long term provisioning of stores for Plan Projects, the day to day procurement presents innumerable difficulties and often leads to delay in the completion of projects. For example, the delivery period for materials like cast iron pipes, electric cables, etc., is about two years from the date of placement of order.

As has been brought out earlier, adequate time must be given to the Engineers for proper planning. This includes accurate assessment of materials required and placing of orders as early as possible to ensure that they arrive in the required quantity and at the proper time. Unfortunately, the rules, as they exist today, do not permit orders being placed unless projects have been approved and funds allotted and, as has been already mentioned, allotments come only after the commencement of a financial year. Hence, even if the materials requirements have been assessed at an early stage, no firm action for procurement can be taken. This results in delay in commencement, and frequent hold-ups of works already commenced. In the ultimate analysis, apart from contractual complications that arise, projects cost more and take longer to complete.

We, therefore, recommend that in the case of proposals, where land has to be acquired or the requisite materials have a long lead time, the budget allotment itself should be given in two parts, the first part to cover the cost of such materials and/or land, and the other given subsequently, as for works in progress, to cover the actual cost of execution. This will enable the Engineering Department to go ahead with the preliminaries in time and thereby ensure the execution of works according to programme. This will also reduce the amount of surrenders and aimlessness in planning.

Having considered the broader aspects of planning, we would like to comment on the innumerable delays involved in the various stages, beginning with the initiation of a project and ending in its technical sanction.

1.8. Study of Requirements of a Project.—Once a project is conceived by a department, the first action in the chain of events is the intimation to the engineering department of the requirements of the project in order to enable the latter to prepare the preliminary estimates and plans for the purpose of obtaining administrative approval. The user department, however, is not always in a position to work out their requirements accurately. The investigations of the Committee on Plan Projects have proved that the study of requirements constitutes a vital step in the scheme of cost reduction and that such a study for any important project should embrace the organisational structure of the user department as well as the methodology of work to be carried out in the proposed project if overall economy is to be achieved. Such a study is not the work of an engineer or an architect alone; it is the combined function of a Committee of experts representing all the technological disciplines connected with the particular undertaking, including work study. The work study specialist in most of the cases acts as a catalyst in bringing about effective "cross fertilisation" of ideas. The determination of requirements for a particular facility such as laboratories may warrant a probe into the time table size and shape of furniture, type and extent of equipment, the method of work etc. An arbitrary or *ad hoc* fixation of requirements without going into these factors in detail cannot be conducive to economy.

The Committee on Plan Projects has carried out studies of this type in a number of typical schemes and requirements have been laid down on a scientific basis. Those could be made use of by the user departments but in cases where requirements have not been laid down, it is advisable to constitute composite groups of the proposed type to enquire into the requirements and arrive at conclusions in a scientific way.

1.9. When once requirements have been arrived at in this way, the user department should refrain from making changes at a later stage. We have come across cases where user departments have changed their mind at an advanced stage of planning and very often even during execution. This not only delays the completion of work but also results in waste of valuable time of engineers in having to deal with lot of contractual problems. It is also one of the causes for rise in cost of project as compared to original estimates. We would, therefore, strongly recommend that requirements should be finalised after careful consideration and when once planning is commenced, no change in requirements should be permitted.

1.10. Another important aspect of the user requirements that is often omitted at the preliminary stage is the location of the site of the project. We have come across numerous instances where the site of a project has not been finalised even after it has been administratively approved and budget provision made. This leads to *ad hoc* designs and estimates and later revision on account of changes in site conditions resulting in dislocation and consequent rush of work in the planning section, delay in the commencement of work and ultimate surrender of funds. In many cases the site of a project has to be acquired. This process takes considerable time and it is therefore essential that the site of a project is determined at the time of initiation of demand, and acquisition proceedings, where necessary, commenced as early as possible. We have earlier referred to the allocation of funds in two stages to facilitate this.

1.11. Stage of Administrative Approval.—The next stage in the process is the accord of administrative approval to a project.

In most of the States, the administrative approval is accorded by the User Departments in consultation with the Finance Department which implies that the competent authority has given its concurrence to the expenditure proposed. This process takes 6 to 8 months. In the C.P.W.D., however, the procedure is split into two stages *viz.*, Administrative Approval and Expenditure Sanction. The former is accorded by the administrative Ministry requiring the work while the latter is given by the Ministry of W.H. & S. upto Rs. 50 lakhs (under the delegation of powers given to the Ministry) and by the Ministry of Finance for estimates exceeding that amount. The time taken in according the sanction is about 8 to 10 months. In the M.E.S., the process of administrative approval consists of two stages: Acceptance of Necessity and the Administrative Approval. The procedure in getting administrative approval is exceedingly slow and it takes anything from 2 to 3 years. We have made a general study of the flow of work in different departments in addition to detailed studies of a few selected cases. The flow diagram in Appendix II reveals the major channels through which the scheme has to pass in M.E.S., C.P.W.D. and two of the State P.W.Ds. The string diagram in Appendix III gives the actual flow of selected cases in these departments upto the stage of administrative approval.

It can be seen from the charts that the procedure adopted by the States for administrative approval is comparatively simple, though there may be minor variations from State to State. In the C.P.W.D., we feel that the expenditure sanction should be given at the same time as administrative approval. This will avoid the same authorities coming into the picture again and again thereby simplifying work and reducing the overall time. With regard to M.E.S., we would have preferred a combination of the two stages of 'acceptance of necessity' and 'administrative approval'. But our studies have shown that in this department there are a number of cases where projects are initiated and later on shelved or dropped thus involving considerable infructuous engineer effort. We therefore consider it necessary to retain the stage of acceptance of necessity.

1.12. Our case studies also show that there is considerable delay at the stage of administrative approval. This can be attributed to the 'shuttle-cocking' of files between the Finance and the engineer departments which is mainly due to the numerous clarifications required by Finance. The situation can be improved if check lists for different types of buildings and facilities showing the norms to be realised are prepared. The Committee on Plan Projects has prepared such check-lists for multi-storeyed buildings, industrial estates, hostels etc. The check-list developed for Industrial estates is given in Appendix IV. If schemes are accompanied by such check lists indicating the figures sought to be realised in comparison with the norms laid down, it would facilitate checking and avoid to a great extent unnecessary queries.

The Committee on Plan Projects is presently engaged on the studies of hospitals, medical colleges, bridges etc. and in all these cases it is proposed to lay down such check-lists along with suggested norms. The engineer department may adopt these check-lists or develop similar ones where they do not exist in consultation with the authorities concerned. We are confident that the development of such check-lists would go a long way in reducing correspondence and back references at the stage of administrative approval and thereby step up the pace of work at this stage. Coupled with this is the need for a business-like approach on the part of all concerned in quickly settling the issues either by personal contacts or through joint meetings.

1.13. Another aspect of the procedure which is peculiar to the Defence Services is the Siting Board at which a large number of officers, representing various interests, assemble to finalise the siting of a large project. We consider that the work of the Siting Board could be simplified by leaving the detailed siting to the engineers once the broad zonal layout has been finalised at the preliminary planning stage.

1.14. We have noticed a tendency sometimes to accord piecemeal approvals to the components of a big project. This militates against overall planning and detracts from economy and efficiency. We would strongly recommend that administrative approval must be given to a project as a whole and the components phased in such a manner that no portion of the project remains unutilised for want of an essential counterpart.

1.15. Detailed planning of works.—Once administrative approval has been accorded to a project and it is included in the works programme, detailed planning is taken in hand by the engineers. If the planning is to be effective, it must be comprehensive and well co-ordinated. We have in another chapter referred to the desirability of introducing Work Study, a Materials Cell, and a Quantity Surveyors' cadre in all engineer organisations. These are essential if efficient planning is to be achieved. As has been mentioned earlier, it is during this planning stage that maximum economies can be achieved. A careful study of layout, design, space utilisation, and specifications, and comparisons with alternatives can yield considerable dividends; and it is here that the co-ordinated efforts of the designer, architect and work study officer are required. In the case of repetitive works, standardisation has an important part to play and should be adopted.

1.16. After the drawings and designs are finalised, the materials provisioner and quantity surveyor take over, the former for taking all action necessary to procure the materials and equipment required for the project and the latter for the preparation of contract documents.

1.17. Our studies in the various engineering organisations have revealed that the above mentioned stages of planning are not given the importance they deserve. This is partly due to the short time that is normally available for planning and partly to the lack of adequate staff. In a large number of cases, works are commenced even before the drawings are finalised. Such situations can be avoided only if the user departments and Ministries are educated in the necessity for allowing adequate time for planning. As regards the Planning Staff, we consider that it needs considerable strengthening in most of the engineer organisations. We have referred to this aspect in another chapter. It must, however, be appreciated by the Finance authorities that understaffing often results in costly designs involving far greater expenditure than the cost of the establishment denied.

1.18. Before work on any project can be commenced, it is required to be technically sanctioned by a competent technical authority. This implies that the drawings, designs and specifications for a work have been thoroughly examined for technical soundness and that the costs are reasonable and within the limits sanctioned.

In most of the cases studied by us, the technical sanctions have been purposeless and accorded merely as a formality in fulfilment of a procedural requirement. Since most works are commenced before detailed drawings are finalised, it implies that the technical sanctions accorded are based on incomplete drawings and specifications and hence do not fulfil the purpose they are intended to serve. In some States technical sanctions are accorded after completion of work whilst in the M.E.S. the technical sanction is merely a copy of the estimate on which the administrative approval is based. The very purpose of the technical sanction is thereby vitiated.

We cannot too strongly emphasise the necessity for according proper technical sanction for all works, as on it will depend primarily the technical soundness of any project.

1.19. No work can commence unless funds have first been allotted for the purpose. The system of budgeting varies in the different engineer organisations. Whilst in some cases the Ministries/Departments prepare their own budget for works, in others these are prepared by the engineer organisation concerned. It is immaterial who prepares the works budget for each Ministry/Department; what is however important is that it must be prepared with the concurrence of the Chief Engineer. Failure to associate the Chief Engineer with the preparation of the works budget can only result in unrealistic demands and substantial surrenders. We have referred earlier to the chaos that prevails in certain States when the Chief Engineer is not associated with the preparation of the works budget.

1.20. Considerable economy in construction can be achieved if projects are planned properly and the impact of such economy on our five year plans can be of a high order if all concerned co-operate. The User Departments and Ministries must realise that a project sanctioned today cannot start tomorrow and that they must plan their requirements well in advance. The Ministries/Departments of Finance must appreciate that techniques have advanced so rapidly and are so complex that staff requirements have increased and also that understaffing often results in higher costs. And, finally, the engineers must be aware that on them depends the success or failure of our Plans and that no effort must be spared in ensuring that proper balance is maintained between the effective planning of a project and the speed at which it is required to be implemented.

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2. CONSTRUCTION AGENCIES

2.1. After planning, the next important step is the preparation for execution of works. At this stage, careful thought has to be given to the selection of the agency for construction, as on this will depend the efficient, economic and speedy construction of works. The following agencies of construction are generally employed for carrying out works :—

(a) Departmental agency.

(b) Private Contractors.

(c) Public undertakings which have recently been set up, like, National Projects Construction Corporation and National Buildings Construction Corporation.

(d) Bharat Sewak Samaj and similar other voluntary organisations for social work.

2.2. Departmental Agency.—In the past, work has been carried out departmentally on a fairly large scale in the Irrigation Departments. These works have been of a simpler type which did not involve employment of skilled labour or heavy equipment. Departmental execution can also be adopted for skilled operations provided the department has the necessary resources of personnel, tools and equipment and adequate financial and administrative powers to enable it to deal with the day to day problems expeditiously. At present, however, the regulations of the Public Works Departments are mainly intended for getting works executed through other agencies.

The P.W.D. Officers, therefore, contend that under the existing set up, it is difficult for the Public Works Organisations to switch over to departmental execution in a major way. We feel that there is sufficient strength in this argument. If the engineer organisations in the country are to take up more of departmental work, procedures regarding purchase of stores, equipment, tools and plant have to be radically changed; greater powers for personnel management must be given; regulations regarding advance payment to skilled labour or material manufacturers have to be changed; larger staff in almost all the sections must be sanctioned to cope with the increased work that will devolve on them. As the introduction of these changes will take time we would recommend that the engineer organisations should not be asked to take up departmental work on a major scale for the time being. However, we would recommend that in cases where the contractor's quotations are unworkable or abnormally high and in other special cases the department should be capable of taking up the work itself and for this purpose it should build up an adequately staffed and well equipped nucleus which could be pressed into service.

2.3. Private Contractors.—Where qualified contracting firms are available it is to Government's advantage to encourage healthy competition amongst them and thereby establish reasonable levels of prices.

As the bulk of works at present is being carried out through these agencies and considerable work will have to be entrusted to them in future, the aim should be to create such conditions as will enable the construction industry to develop on healthy lines.

The normal system of contracts has a distinct advantage inasmuch as when once planning is complete, and the work is let out, the responsibility for arrangement of labour, materials and equipment, rests upon an agency that has, in its own interest, to effect every possible economy. However, there are certain disadvantages which must be guarded against:—

(i) Not infrequently the contractor acts merely as a middleman and sublets large portions of work and earns profit without making any professional contribution.

(ii) In the absence of effective competition the contractors manage to raise the price level, resulting in profiteering.

(iii) The contractors do not always take a genuine interest in the adoption of correct specifications resulting in sub-standard work.

The middleman's profit is an unavoidable element in any enterprise, but we have to guard against the high level of profits. This can be done by a realistic appraisal of rates at the time of scrutiny of tenders. The rates should not be high nor should they be so low as to make quality work difficult or impossible.

We have referred elsewhere to the necessity of maintaining up-to-date Schedules of Rates in the various zones in the country. With the help of these, there should be no difficulty in correct appraisement of the contractor's quotation.

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When it is apparent that the contractors' quotations are unreasonable or when the quality of the work is sub-standard, Government should possess ready means to get the works executed through other agencies. At the same time it is very desirable that we do not create situations where the contractors find it impossible to work. The agreements should be reasonable and the specifications realistic, so that the contracting profession can develop on healthy lines.

2.4. Public contract undertakings.—An alternative to departmental execution is the setting up of Government agencies for construction like the National Projects Construction Corporation (N.P.C.C.) and the National Buildings Construction Corporation (N.B.C.C.). It is encouraging to see that the National Buildings Construction Corporation as well as the N.P.C.C. which entered the field of constructional activity very recently have done good work. They have played an effective part in keeping down costs, improving quality and in curbing the tendency of the contractors to quote high rates. Especially where due to lack of an adequate number of contractors, there is tendency for high quotation, these agencies can play a very effective role. They should also be equipped to take up specialised forms of construction, such as shell roof, folded plate etc., which if left to professional contractors may result in high rates. Considering the advantages of such a Government agency, we recommend that similar organisations are set up in the states.

2.5. Social organisations engaged in construction work.—The construction work envisaged in the present and future plans is so vast and varied that the existing agencies for execution are inadequate to cope with the work. It is imperative to bring in other organisations to play an effective role in the construction activity. Social organisations come in handy for this purpose. If properly developed, they can play their part in construction works. Such organisations have an added advantage that they ensure people's participation in the task of nation building and enable a part of the profit to be utilised for providing community facilities. They also encourage initiative among workers and thus help in building up leadership.

An important social organisation which has come into the field recently is the Bharat Sewak Samaj. Some of its achievements are contained in Appendix V. From this, it will be seen that the Samaj has made good headway. The cost of work so far undertaken by them totalled Rs. 5 crores and we are told that there was a saving of Rs. 1 crore to the exchequer. Out of the Samaj's earnings, about Rs. 20 lakhs were utilised in creating civic amenities, such as, wells, schools, balwadies etc. Labour housing has been improved and medical and other health facilities extended.

From the few cases presented to us, we find that the Bharat Sewak Samaj has been instrumental in bringing down cost of materials. Their experimentation in the field of supply of materials in Delhi has shown that it is possible to cut down the cost of bricks by 20%, that of sand by 33% and that of ballast by 10%.

Where the Bharat Sewak Samaj has been manned by adequate technical personnel and equipped with necessary tools and plants, they have been able to compete with established construction agencies. We understand that in a project in Bombay, they were able to secure a work at Rs. 24.5 lakhs against Rs. 31 lakhs quoted by the next lowest contractor. We, therefore, recommend that the Bharat Sewak Samaj be further developed and, for this purpose, we make some suggestions. As a first step, they should have adequate technical personnel to plan and supervise the works. With regard to tools and equipment, it should be possible for the Public Works Departments to hire out initially their tools and equipment. Side by side, the Samaj should provide itself with their own equipments.

As it is a social organisation, it requires sympathetic treatment from the employing agency. It may be given exemptions from payment of earnest money and security deposit. The Samaj, on the other hand, should see to it that there is no compromise in the quality of works.

2.6. Contracts.—As has already been brought out earlier the major portion of construction activity on behalf of Government is carried out through the agency of contractors. Speed and cost of construction are hence linked, to an appreciable extent, with the system of contracting and the administration of contracts.

Our discussions with representatives of the Builders' Association of India have revealed that there is a strong feeling among contractors that the conditions of contract are one-sided and operate harshly on them. They contend that there are so many uncertain factors and risks that provision has to be made by them in their tendered rates to cover such contingencies. To quote one such example, the government, owing to its inability to fulfil its contractual obligations, such as, supply of stores, drawings etc. can suspend a work for any length of time, whereas the contractor is only entitled to an extension of time, but no payment to cover his running overhead expenses, etc. during the period of suspension. A further source of irritation to contractors is the inordinate delay in the payment of their final bills and refund of security deposits which results in the locking up of their working capital. We have given a great deal of thought to this problem and carried out numerous studies, and find, that although there is considerable room for improvement in the performance of contractors themselves, there is some measure of justification for the views held by them. It would appear that Government is, therefore, indirectly paying for inadequacies in its contract system. Rationalisation of the system is therefore essential.

2.7. As a first step, we consider that it is essential to unify the various systems of contracting prevailing in the country. This will not only further the process of technical integration but will also make it easier for contractors to work for different engineer departments, each of which has at present its own rules of procedure and conditions of contract.

To this end we have, after examining the procedure existing in the various departments, evolved standards for:

(a) *Rules for enlistment of contractors.*—These have been recently codified by the Ministry of W.H. & S. and are in use in the Central Public Works Department. We consider that all engineering departments should adopt these rules, details of which are given in Appendix VI.

(b) *Rules for earnest money and security deposit.*—The main features of our proposals are that:

  (i) Contractors who have not paid the standing security deposit will be required to pay earnest money at the rate of 1% of the estimated cost of work put to tender subject to a maximum of Rs. 20,000.

  (ii) On acceptance of tender, the earnest money will be converted as part of the security deposit. In addition, further recoveries to make up a total of 10% towards security will be effected from running payments.

(iii) The security deposit will be released in three stages, 50% on completion of work, 25% on payment of final bill and 25% on completion of the defects liability period. The details of the proposals are contained in Appendix VII.

(c) *Notice of tender.*—A common form has been evolved which is given in Appendix VIII.

2.8. Work has also commenced on the preparation of the Standard Schedule of Rates by zones and the General Conditions of Contract. As the work involved in these two subjects is enormous and will take appreciable time, we have not thought it proper to hold up presentation of this report, pending their completion.

We have also considered the feasibility of having an All India List of Contractors, but feel that for the present it is not practicable.

There are various aspects of the contract system which have a direct bearing on costs and speed of construction. Amongst the foremost of these are, the type of contract used and the accuracy with which it is prepared, the Schedule of Rates on which it is normally based, the General Conditions of Contract and promptness in the payment of bills.

2.9. Types of Contracts.—The form of contracts commonly in use in Public Works Departments is the Item Rate or Percentage Rate Contracts. The Military Engineer Services, however, prefer to execute most of their projects through the Lump Sum form of contract, a form which is in common use in many advanced countries. The fundamental difference between the two forms of contract is that in the former case, the contractor has only a general idea of the scope of the work; the detailed working drawings, in many cases, only being supplied to him as the work proceeds. The basic feature of these contracts (Item Rate or Percentage Rate) is that all work done has to be measured—a laborious and time consuming process which invariably leads to delays in payments. On the other hand, in the case of the Lump Sum contract, the contractor is supplied, before he tenders, all details of the work, including working drawings, supported, in some cases, by Bills of Quantities or schedules of works, prepriced by the Department. As the contractor quotes a lump sum for the work, no measurements are involved except in the case of deviations. Although the adoption of the Lump Sum contract requires more time in the preparatory stage, this is more than compensated by speedier completion of work and considerable reduction in contractual problems.

We, therefore, recommend that the Lump Sum form of contract be adopted, in preference to the other forms, in all engineering departments specially in the case of buildings. As the Lump Sum type of contracts particularly those based on Bills of Quantities require special techniques in their preparation, which are at present not generally known, specialised training in Quantity Surveying will have to be imparted to personnel. Our proposals for the eventual introduction of Quantity Surveyors in all engineering departments have been made in Chapter 7 of this report.

The Panel on Residential Buildings of the Buildings Projects Team have, in their report published in January 1961, also recommended the adoption of the Lump Sum form of contract.

2.10. Accuracy of Contract Documents.—The smooth progress of work on a project is dependent to a large extent on the accuracy with which the details of the contract are prepared. Unfortunately, today in many departments, sufficient time is not devoted to the preparation of details. This is due largely to pressures which are brought to bear on the engineers, in the mistaken belief that it will lead to speedy implementation of projects.

As has been brought out in an earlier chapter it is in the planning stage of a project that real economy can be achieved and yet it is at this particular stage that the engineers are virtually compelled to rush the work.

The contracts prepared in many departments leave a great deal to be desired, inasmuch as, detailed working drawings are rarely issued at the time of going out to tender. The schedule of items of work, on which the contractor bases his tender is therefore, at best, only a theoretical assessment of the work required to be executed. In consequence, during actual construction, after the working drawings are issued, numerous extra or substituted items, arise.

During the course of our studies we came across one case, where for a contract comprising 215 items valued at Rs. 23.4 lakhs, the extra and substituted items numbered 187 amounting to Rs. 12.06 lakhs. In another case, a contract of 20 items valued at Rs. 16.3 lakhs had 27 extra items amounting to Rs. 3.3 lakhs.

These extra items often give rise to disputes with the contractor on the question of rates, some of which eventually lead to arbitration. This, in our opinion, is one of the major reasons for higher costs and delays in the completion of works.

It is essential, therefore, that tender documents are prepared with due care and in the greatest detail possible before going out to tender. To achieve this, adequate planning staff must be made available commensurate with the works load. We have referred to this aspect in a later chapter. More important, however, is the fact which must be appreciated by all concerned, that adequate time spent initially on planning eventually results in speedier work at less cost.

2.11. Schedule of Rates.—The Schedule of Rates is the basis for pricing of most forms of contract and also for determining the reasonableness of contractors' quotations. To be effective, therefore, a

Schedule of Rates should be comprehensive and up-to-date. Those in use today by most departments, although reasonably up-to-date, contain too many ambiguities. As a result, when items of work have to be priced, difference of opinion arises as to the rates applicable. This in turn leads to disputes and delays in the finalisation of projects.

A comparative study of the various schedules has revealed that there are wide variations in the description of items, the units used, the method of measurement and the basic data adopted in the preparation of the rates. Further, the specifications adopted also vary to a considerable extent.

We have, therefore, thought it fit to commence work on the preparation of Standard Schedule of Rates, by zones, based on the standard method of measurement laid down by the Indian Standards Institution, and recommend that on completion, it be adopted by all engineer organisations.

Since it will be necessary to maintain the schedule up-to-date, we further recommend that a permanent cell be formed for this purpose in each zone under one of the Engineering authorities in that zone; co-ordination of the work of these cells being done by the Planning Commission.

2.12. General Conditions of Contract.—The general conditions of contract in all engineering departments have been framed with a view to safe-guarding Government interest which, however, has been carried to such an extent that even in a situation which may arise out of the default of Government, the onus is always on the contractor. For example, if the designs of the Government infringe any patent rights, the contractor is liable to pay royalties arising out of such infringement. On his part, the contractor has no other alternative but to accept these risks, which he covers by enhancing his tendered rates. In effect, therefore, Government is paying an appreciable amount on all its works on account of the safety clauses of the contract.

Whilst appreciating the necessity for safeguarding government interest, we do not think it desirable or equitable to make the conditions of contract so oppressive and one-sided as to operate harshly on contractors; since the existing practice eventually leads to higher costs and affords opportunities for abuse of power.

We have therefore given our recommendations for redrafting what we consider the offending clauses, which are attached at Appendix IX. These will be incorporated in the standard general conditions of contract which the M.E.S. have kindly undertaken to draft for and on behalf of the Panel.

We are confident that these revised conditions of contract will lead not only to fair and equitable conditions of working but also to economy in construction.

2.13. Delays in the payment of Bills.—Business is dependent to a large extent for its success on a quick turnover of capital. In this respect the contracting agency is no exception since its ability to take on more work is dependent on quick payment of bills. Large sums of money locked up by way of security deposits and bills for work done limit considerably the ability of contractors to expand their business. To overcome these losses arising out of locked up capital, contractors make adequate provisions in their tendered rates. Hence, because of its inability to ensure prompt payment of bills, government is indirectly incurring additional expenditure on all its works.

Case studies carried out by us reveal that there is inordinate delay in most engineering departments in the payment of final bills. In one department, only 45% of bills were paid within 6 months of completion of work and 70% within a year.

Our studies have further revealed that the main reasons for departmental delays in payment are:

(a) delays in final measurement of works;
(b) delays in sanction and disputes with contractors on the question of rates for extra/substituted items;
(c) delays in disposal of application for extension of time.

In one department it was noticed that bills had to be pre-audited twice by the accounts authorities before payment resulting in delays ranging from one to two months without any significant financial effect. This aspect has been referred to in a later chapter.

In our recommendations for changes in the conditions of contract, mentioned earlier in this chapter, we have made provision for the payment of undisputed bills or portions of bills within 4 months of the certified physical completion of the work.

2.14. With the more extensive use of the Lump Sum form of contract, and the adoption of the revised conditions of contract, and the proposed Standard Schedule of Rates, we are convinced that not only will the number of disputes with contractors be reduced considerably but that it will also result in speedier construction and reduced costs.

The measures that have been proposed will go a long way in redressing the grievances of the contractors and will also almost eliminate the uncertainties that are today inherent in tendering. For their part, contractors should not be motivated by profit incentives alone, but must consider themselves as partners in the enterprise of building up the economy of the country. It calls for more advanced techniques of construction, a spirit of co-operation and most important of all a high code of integrity. We are confident that they will accept the challenge.

2.15. Arbitration.—In the context of what has been stated earlier in this chapter, it will not be out of place to consider the several aspects of the subject of arbitration.

The primary intention of settlement of disputes through the process of arbitration is to avoid delays and costs that are usually associated with litigation. Case studies carried out by us, however, reveal that there is considerable delay in the finalisation of arbitration cases. In one department there are about 400 arbitration cases pending, whilst in another, there is a pending arbitration case relating to a work completed about 8 years ago (see Appendix X). Such delays defeat the very purpose of arbitration.

Our studies further reveal that disputes with contractors arise largely out of ambiguities in specifications and in the Schedules of Rates and also out of lack of precision in the preparation of contracts. The adoption of our recommendation, made earlier in the chapter, will, we are sure, go a long way in reducing the incidence of arbitration.

2.16. Need for speeding up the process of arbitration.—Where references to arbitration are inevitable, much can be done to speed up the process of settlement. In our recommendations for the redrafting of certain clauses of the contract we have already made provision to ensure the early appointment of an arbitrator.

In one department, we found that a great deal of time is wasted in the scrutiny, at all levels, of the list of claims which the contractor intends to refer to arbitration. The Chief Engineer finally deletes such items as he thinks are not properly referable to arbitration and then proceeds to appoint the arbitrator. We do not consider this practice equitable or desirable. It is hardly proper that one party to a contract should decide what the other party can or cannot claim as such questions are best left to the arbitrator to decide. We, therefore, recommend that this practice should be discontinued.

In the submission of the government statement of the case to the arbitrator, much time is lost in one engineering department where the rules provide for the statement to be sent to the Accounts Department for advice before submission to the arbitrator. We consider this step unnecessary as apart from delaying the proceedings, little contribution is made by the accounts authorities in such technico-legal matters.

2.17. Appointment of Arbitrator.—As regards the appointment of the arbitrator, the practice prevailing in all engineering departments is that disputes are referred to the sole arbitration of an officer appointed by the department. The representatives of the Builder's Association of India, during their discussions with us, have stressed that as a matter of fundamental principle the arbitrator appointed should be acceptable to both parties; failing which, each party should have the right to appoint one arbitrator and the dispute referred to joint arbitration. They also suggested, as an alternative, that disputes arising in one department should be referred to the sole arbitration of an officer from another department. They, however, conceded that the present practice has operated very fairly on contractors. We have given very careful consideration to their plea and feel that since the present system has worked satisfactorily, and is speedy in disposal it should continue.

In most engineering departments, different officers are appointed as arbitrators from time to time. In one department, however, all arbitration cases are referred to a single officer who has been specially appointed to deal with arbitration cases only. The former system has the advantage of flexibility of approach to disputes. The experience that senior officers gain by undertaking arbitrations can be of great value not only to the officers themselves but also as a means of appreciating and correcting the inadequacies in departmental administration and procedure. The latter system is based on a core of officers with specialist experiences in arbitration cases, thus avoiding to a great extent inconsistencies in decisions.

Both systems are satisfactory and it should be left to the engineer organisation concerned to select the system which suits it best.

2.18. Implementation of Award.—The present practice pertaining to implementation of awards differs with various departments.

In one department the Chief Engineer is fully competent to decide whether an award should be implemented or not. He has, however, to obtain the advice of the accounts and if necessary, legal authorities before arriving at a decision. In another department, the Chief Engineer is competent to implement awards up to Rs. 20,000 only, beyond which the sanction of Government is necessary. In most of the States, the implementation of all awards irrespective of amount has to be referred to Government for approval. In a few cases that were studied it was found that reference to Government involved a delay of from one to two months, but in no case did the Government disagree with the advice of the Chief Engineer.

Once an award has been given, there are only two courses open; either to implement or dispute the award in a court of law. We, therefore, advocate that Chief Engineers be given full powers to decide whether an award should be implemented or not, after taking legal advice where he considers necessary.

Even after a decision to implement the award has been taken, the procedure involved in getting the allotment of funds takes appreciable time in some departments.

In one department, a statement of case has to be submitted to the Ministry who after scrutiny obtain a legal opinion and also the views of the Ministry of Finance after which the requisite amount is allotted. In another department, the Chief Engineer receives an allotment at the commencement of each year from which payments are made without delay. Once it has been decided to implement an award, we see no reason why any further reference to any Ministry should be necessary. To avoid this reference and to expedite payments, we recommend that a lump sum allotment should be placed at the disposal of Chief Engineers at the beginning of the financial year.

2.19. The implementation of the measures recommended by us will, we are convinced, speed up the finalisation of arbitration cases.

3. EXECUTION OF WORKS

3.1. Two important factors play a vital role in the efficient execution of works: one is the efficiency of the construction agency entrusted with the work and the other is the ability of the executive to steer the work through in a systematic manner.

The former has been dealt with at length in the earlier chapter. We shall now deal with some of the salient features of execution of works by contract starting from the invitation of tenders to the closing of accounts.

3.2. Invitation of tenders.—As has already been brought out earlier, no action to invite tenders should be taken until detailed planning including designs and drawings has been completed, the site is available and supply of stores ensured. It needs no emphasis to state that widest possible publicity should be given to an impending work to attract suitable contractors and to ensure adequate competition. The medium of the press is the surest way of getting adequate publicity. During our study, we came across wide variations in the matter of advertisement of works in different departments. In one department, all works costing Rs. 10,000 and above are to be advertised in the press whereas the limit in certain other departments is Rs. 1 lakh. We feel that normally works costing Rs. 1,00,000 and above should be advertised in the press.

Normally tender documents are supplied on application to all enlisted contractors of the class entitled to tender for the work. The idea seems to be to obtain low quotations by creating greater competition. But it must also be realised that very low quotations can imply sub-standard work. As mentioned rightly in the report on Multi-storeyed Buildings of the Buildings Projects Team, satisfactory quality of complicated works can only be obtained by engaging efficient builders. For this purpose, it may be necessary to limit the issue of tenders to only selected firms of approved performance in the type of work to be executed. We endorse this view and recommend its adoption for all specialist works.

While on the subject, we would also recommend that for important works, it may be desirable to call for tenders on alternative designs. This of course is possible only when the limited tendering system as mentioned in the earlier para is adopted. We would even recommend that payment for preparation of initial designs may be made in order to enable the contractors to prepare alternative designs and give quotations for the same.

We have separately discussed the powers of acceptance of tenders. The authority that can accept the tender will naturally have to approve the tender documents. But, after approval, tender documents are issued at different levels in different departments. In M.E.S., the

Garrison Engineer, Commander Works Engineer and the Chief Engineer all issue tender documents which they are empowered to accept. In West Bengal, the Superintending Engineer opens the tenders which he has to accept though the issue itself is done through the Executive Engineer. In some other State P.W. Deptts. and C.P.W.D., irrespective of the value of work and the authority for its acceptance, the tender documents are issued only by the Executive Engineer who also opens the tenders and effects initial scrutiny. This system naturally puts a heavier strain on the Executive Engineer as all the initial work converges on him. A comparative study done by us of the different systems is described in Appendix XI. It can be seen from the study that where the accepting authority does all the work connected with the issue of tenders, their opening and scrutiny, the time taken between the issue of tenders and their final acceptance is low. On the other hand, where the jobs of issuing, opening and scrutinising tenders converge on an Executive Engineer and he is not the accepting authority, this time interval is quite considerable.

We feel there is a definite advantage in avoiding unnecessary convergence of work at the Executive Engineer's level. If the accepting authority issues the tender documents or gets it issued and proceeds with all the other formalities, such as, opening, scrutiny etc., much of the time can be saved and incidentally it may also lead to better control over the entire procedure of work. This system may, however, raise some difficulty where tenders are priced as officers higher than the Executive Engineers do not have disbursing powers. But this is a minor difficulty which can be easily overcome by asking one of the Executive Engineers to issue the tender documents; the preparation and the subsequent opening being done by the higher authorities who are empowered to accept the tenders.

We would even suggest that the engineering department should consider the possibility of issuing tender documents free of cost as is the practice prevalent in the M.E.S. for the past twenty-five years.

A study of a few cases in different departments revealed that even though the time given for tendering was one month from the date of issue of tender documents to the date of opening, it was actually much less as the detailed drawings etc., were made available to the tenderers only a week or so prior to the opening of the tenders. This defeats the very purpose of giving adequate time to tenderers. We recommend that a clear period of one month should be given to the tenderers to submit their quotations and the department should take care to see that they supply all the necessary details along with the tender documents. We had occasion to refer earlier to the imperative need of finalising drawings and details before calling for tenders. If this is done, there should be no difficulty in making the details available to the tenderers in time.

3.3. Acceptance of Tender.—We have mentioned earlier that the time taken for the acceptance of tenders varies widely. In departments where the accepting authority issues the tender and does all preliminary work connected therewith, the procedure for acceptance is simple. In C.P.W.D., however, the acceptance of tenders is a lengthy process as it has to go through several channels. This is further aggravated because of the fact that the Chief Engineer is not the final authority in accepting tenders costing more than Rs. 5 lakhs (now Rs. 10 lakhs). These tenders have to be referred to "The Central Works Advisory Board". We have made a study of the cases referred to the Board and find that the Board merely gives formal acceptance to the recommendations of the Additional Chief Engineer. Reference to this Board only delays acceptance. We have come across cases where on account of delays in acceptance of tender, contractors have withdrawn their offers after months of waiting, thus necessitating the recall of tenders and subsequent acceptance at higher rates. We, therefore, recommend that the Chief Engineer/Addl. Chief Engineer should be given full powers for acceptance of tenders as is prevalent in most of the States and M.E.S.

While on this subject, we would like to refer to the present day practice of accepting the lowest tender irrespective of whether it is workable or not. Although engineering authorities are empowered to accept tenders other than the lowest, these powers are rarely, if ever, exercised because the atmosphere of mistrust and suspicion that prevails is such as to inhibit technical officers from accepting responsibility. In one State Government, certain committees have been set up at different levels for acceptance of tenders which are not the lowest. After studying the work of such committees we find that no purposeful contribution has been made by them. They generally approve what has been recommended by the Engineers.

We therefore recommend that engineering authorities should be empowered to accept where necessary tenders which are not the lowest, subject to intimation to the next higher engineer authority.

3.4. Commencement of work.—Various practices are in vogue in different engineer organisations regarding the time allowed to contractors for the commencement of work after the acceptance of tender. In some States, the commencement of work is reckoned from the date of acceptance of tender even though it sometimes happens that the site may not be available. We have earlier recommended that no tender should be invited if the site is not available. Further, if the commencement of work is reckoned after approximately 10 days from the acceptance of tender, it will give time to the contractor to make initial preparations. Our proposals for this are contained in the modified notice of tender at Appendix VIII.

3.5. Programming of Works.—A pre-requisite for efficient execution is proper programming. When once the tender is accepted, it is the duty of the contractor or the building agency to work out a detailed programme in consultation with the engineer incharge. In our studies, we have rarely come across well-conceived programmes of this type. Certain charts of the Gantt type have been introduced by certain agencies. These were quite sketchy and inadequate from the point of view of effecting adequate control over works especially where several agencies were involved as in the construction of a neighbourhood. Programming of works of the different components with a view to having an effective balance in construction is a *sine qua non* for successful completion of works. In the absence of such a programme, some facilities are completed prematurely leading to idle investment ahead of utility.

The panel on National Water Supply and Sanitation Schemes set up by the Committee on Plan Projects has referred in detail to such lack of programming and injudicious phasing of works which have led to an unbalanced development of facilities. We feel that it is this lack of adequate phasing and programming that is responsible for the wide gap between the commitment of expenditure and realisation of physical assets. If the plan projects are to have their impact on the public, it is absolutely essential to see that the flow of benefits is commensurate with the expenditure incurred.

Having considered the problem in detail, we feel that the programming techniques available today have three main deficiencies :

(a) They do not aid the planners and designers in reckoning all the limiting factors in the successful completion of projects, with the result that certain items which have a limiting influence on the work as a whole are lost sight of leading to slowing down of work at a later stage or even to wholesale suspension.

(b) The flow back of the information is not well-conceived. Consequently, the controlling office is provided with documents which cannot be purposefully made use of, and

(c) There does not exist a clear idea of the predetermined levels of activity at different points of time during the execution of work against which the actual progress could be measured.

We feel, it is the last drawback which is mainly responsible for the slackness in control over works. The problem of programming has naturally been exercising the minds of the Committee on Plan Projects for some time and they have produced a new technique known as "The Line of Balance Technique" for programming and progressing of works. A small resume of this technique is given in Appendix XII. We feel that this method fills a long felt need for a scientific system of programming and progressing against pre-determined levels of activity. The charting technique is simple and makes it easy to have a visual comprehension of the progress on different controlling items of works at any particular point of time against pre-determined levels of activity for keeping effective balance between components while being in phase with the final targets. It is easy for the controlling officers to see where the levels of activity are higher or lower than the balanced level so that they can take adequate action in time to pull up items of work which are lacking or readjust the targets if need be. Especially where different agencies are involved, we feel that this system would be very helpful in securing proper balance in the level of execution with a view to achieving the targets.

The Line of Balance Technique is nothing esoteric. It is quite simple and affords a visual appreciation of the stage of work by all concerned in the same perspective. We strongly recommend that all authorities concerned with the planning and execution of works acquaint themselves with this technique and adopt the same in programming and progressing of works. Having seen to what extent money is wasted in the unbalanced development of facilities, (residential construction ahead of services, treatment works ahead of sewerage, full scale development of head works and distribution system without any attention given to pumping main) by way of loss of interest on capital spent and recurring costs on maintenance to keep them in good condition till they are actually used, we cannot but lay special emphasis on the need for scientific programming and progressing of works.

3.6. Extra items of work.—We have mentioned earlier that extra items of work were largely responsible for increase in cost, delays and contractual difficulties. An analysis, we have made of the extra items that have cropped up in a number of cases, shows that these are mainly due to:

(a) inadequate planning both architectural and structural,
(b) non-availability and consequent substitution of materials, and
(c) changes in requirements proposed by user departments in the course of work.

In the earlier chapters, we have focussed attention on all these aspects and have given specific recommendations for minimising the extent of extra items due to these reasons.

The main problem, however, is the way in which these extra items are being dealt with in the various departments. Invariably we have seen that orders are not given in writing, authorising such extra items, and rates are not finalised till long after the close of work. If adequate action is taken by the engineering authority to fix up the rates for extra items as and when they occur, most of the difficulties arising out of extra items could be mitigated. To further facilitate speedy action, we have suggested enhanced powers for engineering officers with regard to sanction of extra items. These are given in Appendix XIII.

3.7. Extension of time.—Our study also shows that projects are rarely completed within the time stipulated in the agreement. This is found to be due to failures on the part of either the contractors or the Government Departments. The extension of time varied from 25% to as much as 300%. This is by no means conducive to efficiency or economy. An analysis of a number of cases made by us revealed that where extensions were given for departmental reasons, such extensions of time were mainly due to:

(a) fixation of time on an *ad hoc* basis,
(b) delay in the handing over of site,
(c) variations in work leading to extra items,
(d) delay in supply of architectural and structural drawings,
(e) delay in supply of materials,
(f) lack of timely decisions.

Everyone of these can be avoided if adequate thought is given at the planning stage. There is no excuse for fixing up time on an *ad hoc* basis. In a case studied by the C.O.P.P., the time for a six-storeyed building with complicated details was fixed as 10 months and tenders called on that basis. The building was completed in 26 months. Such unrealistic time schedule only results in inflated tender without achieving the desired objective. In addition, it brings in its wake other contractual complications. If work is programmed scientifically taking the lead time relationships of its various constituent elements, one can arrive at the optimum time for its execution. It will be useful to prepare a statement for fixing up lead time and time coverage for the various items of work and the assumptions underlying those.

Such preliminary preparations would strengthen the hands of the engineer in fighting the tendency prevalent today of forcing engineers into irrational and unworkable time schedule. Some other reasons for extension of time *vide* (b), (c) and (d) above can be eliminated if, as recommended earlier, work is started only after the planning is completed and land is made available. Coming to the supply of materials *vide* (e) above, our studies show that 25% of the extension of time cases are due to this. This only emphasises the need for material budgeting and advance arrangement for scarce materials which we had occasion to refer to in the chapter on planning. The above recommendations to a large extent would minimise the need for extension of time. If, however, there is need for extension, it should be expeditiously dealt with. The contractor should put in his application for extension of time promptly as and when there is reason for such extension. To facilitate quicker disposal of extension of time cases, we have recommended enhanced powers for engineering officers.

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Last but not least, we would also emphasise the need for timely decisions at the work site *vide* (f) above. The tendency to avoid taking decision and refer matters to higher authorities has crept in mostly due to the harmful effects of the technical examination and the unrealistic attitudes of persons in authority in respect of minor faults or errors of judgment. The Planning Commission have recognised this limitation and expressed the importance of allowing different levels of management to play their role in the efficient execution of plan projects. We only wish that the authorities act upto this.

3.8. Payment of running bills.—In the cases studied by us, we did not come across any appreciable delay in the payment of running bills. Payments are made more or less once a month except in a few cases where the periodicity of payment was varying. Nevertheless, the drill involved in monthly payment of running bills is quite considerable as detailed measurements have to be taken and the bill checked to a great extent in the Sub-divisional as well as Divisional Office. A survey of time taken by a Sectional Officer on measurement shows that 1/4th of his time is spent on this. The time taken on this by the supervisory staff can be reduced and they can be utilised for better supervision if lump sum contract system is used. Another way of expediting the monthly payment is to take recourse to advance payments and payments on measurements in the alternate months.

3.9. Payment of final bills.—Our case studies have shown that the final bills are delayed because of:

(a) delay in sanction of the extra items,
(b) delay in sanction of extension of time,
(c) delay in recording measurements.

Our recommendations given earlier will to a great extent reduce delays on account of (a) and (b) above. With regard to (c) we would strongly recommend that measurements should be recorded as and when works proceed. There should not be any excuse for slackness in such recording of measurements.

Apart from these, there are administrative actions interfering in the speedy settlement of final bills. One such we would like to mention is the frequent transfer of officers. Especially in the case of important works, transfer of officers in the final stages will generally lead to delay in settlement of bills. To avoid situations of this type, we recommend that the staff actually concerned with the execution of the work should not be transferred till such time as the final bill is prepared. If some of the incumbents are due for promotion, it should be given effect to while they are yet in their present positions.

3.10. Defects liability period (maintenance period).—This period varies with types of work and also from department to department. In C.P.W.D., this period is three months for buildings and six months for roads whereas in M.E.S. it is one year. In some States like Assam the period is six months. There can be arguments both for and against fixing a long defects liability period. We feel that if specifications are realistic and adequate supervision is exercised during the execution of work, there is no need to fix an unduly long period which cannot but lead to higher quotations. A period of 6 months seems to be reasonable for all types of works.

3.11. Closing of Works Accounts.—According to codal instructions, the accounts of works should be closed soon after its physical completion and the building brought on to the register of buildings maintained in the Divisional Office. We, however, noticed that these instructions were rarely followed. For the works completed a year or two back neither the accounts had been closed nor the buildings had been brought on the buildings register. The reasons stated for the non-compliance **were**:

(i) delay in settling of contractor's claims,
(ii) delay in the clearance of "Purchase" balances that affect the works outlay,
(iii) delay in the disposal of surplus materials.

The necessity of prompt payment to the contractors has already been stressed. The delay due to the clearance of suspense balances and disposal of surplus materials can be overcome by passing the materials through Stock Account as recommended by the Rates and Costs Committee appointed by the Ministry of Irrigation and Power and already endorsed by the Buildings Projects Team in its Report on Multi-storeyed Buildings. The object can be achieved by the creation of a Stores Sub-Division or a Division according to the requirements of a case.

3.12. Project Reports.—The extent of construction activity in our country generated by the Plans is really prodigious. Varied types of works are being carried out in different situations. But unfortunately no systematic record of the procedure of work, difficulties encountered and how they have been over-come is available except for a few stray articles here and there in some magazines. Even here only the successful part of the projects is covered and no mention is made of the failures. It is needless to emphasise that we learn more from failures than from success. Systematic documentation of all works as they proceed including failures, if any, and the reasons for the same should be carefully recorded as that would be a good guide for the planning and execution of works in the future.

Absence of such documentation can mainly be attributed to rush of work, lack of adequate technical personnel and fear of recording failings, lest they should recoil on some one. It is easy to overcome the first two difficulties if the authorities are conscious of the importance of such documentation and make it a rule that officers incharge of execution should keep a log book for recording the major events as the works proceed and produce a technical note at the end of the work which should be properly filed with completion drawings. But the third difficulty, namely, the fear of recording failures is a real one and can be overcome only if all the higher authorities, administrative and technical, understand the importance of learning from failures and co-operate in documenting the same.

3.13. Maintenance works.—The case studies we have conducted of maintenance procedure in P.W.Ds. show that there is no difficulty in allotment of funds, administrative approval and technical sanction connected with maintenance estimates. A point to be considered is the way the maintenance cost is fixed for different types of buildings. Certain departments work it out as a percentage cost of the building while certain others do it on the basis of the previous years' expenditure. To obtain uniformity we would recommend the former method provided, different percentages are fixed for different types of buildings and also for buildings of the same type constructed in different periods. The schedule of maintenance cost fixed by the C.P.W.D. is given in Appendix XIV. It takes into account the factors mentioned above and is quite reasonable. We recommend that the same procedure may be adopted in all other departments.

The percentage cost for maintenance is fixed by the Chief Engineer in C.P.W.D. while in State Governments, the power is not with the Chief Engineer. We feel that the Chief Engineer as Technical Adviser of the Government is the person who can properly assess the percentage rate for different maintenance works. The power to fix up the rates, therefore, should vest with the Chief Engineer.

There was some suggestion that technical sanction for maintenance works estimates need not be given as that adds to work at different levels. But our case studies have shown that these have not contributed to any delays. On the other hand, technical sanction of the maintenance estimates enables better control over expenditure on maintenance. We recommend that the existing practice of according technical sanction to maintenance estimates should be continued. The only point is that such estimates should be prepared and technical sanction given much in advance so that maintenance work can start as soon as the allotment of funds is made.

Coming to the execution of maintenance works, the practice adopted by various departments differs. In West Bengal, the entire maintenance work is done through contracts. In C.P.W.D., 55% of maintenance work is done by contract and 45% through work charged establishment. In the M.E.S., 68% of work is done through contract and balance 32% departmentally. In Railways, practically all work is done departmentally. Where maintenance work is carried out through contracts, the system of contract varies. In some cases a term contract on a zonal basis is entered into and requisitions placed from time to time. In other cases contracts are for particular works. It is difficult to fix up any uniform procedure in this respect. The existing methods have grown with the departments. We have, however, seen that getting all types of maintenance works through contract is not satisfactory as the contractors are prone to delay small items of work, much to the inconvenience of users. The normal maintenance programmes can be got executed through contract agencies and *ad hoc* repairs departmentally.

3.14. The need for co-ordination.—There is considerable lack of co-ordination between different departments and even between different branches of the same department with regard to capital and maintenance works. As referred to earlier, there is no co-ordination between the building work and internal services and also between the several services, such as, water supply, roads, storm water drains etc., in a development scheme. In maintenance works also, this lack of co-ordination is equally evident. Roads are paved and then ripped open for remodelling of services; patch repairs are carried out after the periodical services. These naturally lead to infructuous expenditure and inconvenience to all concerned. We would strongly recommend a closer liaison between engineering interests in the same locality with a view to effecting proper co-ordination in the planning and execution of works, whether capital or maintenance.

4. TECHNICAL EXAMINATION

4.1. In the earlier chapter, we have discussed the problems and procedures relating to execution of works of both categories, capital and maintenance. In this Chapter we shall discuss the procedure and organisation for audit of performance which has come to be known as "Technical Examination".

As a means of understanding the problem in all its aspects, it would be pertinent to trace the history of the introduction of technical examination and also its subsequent development in the various engineer organisations in the country.

4.2. Origin of Technical Examination.—A Technical Examiner's branch was first introduced in the M.E.S. (Military Engineer Services) in February 1935. This followed the introduction of a similar organisation in the military works organisation in the U.K. The main object of this new organisation was to provide technical guidance to military engineers who for reasons of exigencies of military service could not get adequate opportunity for gaining experience of constructional jobs and the procedures relating to preparation, execution and interpretation of contracts, and payments of bills and safeguard Government interests against the possibility of overpayments, non-compliance with specifications of designs and erroneous interpretation of the terms of contract.

In India, this organisation styled as Chief Technical Examiner of Works was placed under the control of the Quarter-master General, where it has functioned throughout except for a period of about 5 years during the war when it was under the control of the Engineer-in-Chief.

In the U.K., the country of its birth, the organisation was abolished at the outbreak of the war and has not been revived since.

4.3. Recent Developments.—In India, on the other hand, this principle of technical examination has been extended to other engineering departments. In 1957, an organisation for technical examination was set up for the C.P.W.D. and was placed under the control of the Ministry of Works, Housing and Supply. Subsequently similar organisations came into existence in Maharashtra, Gujarat and Uttar Pradesh. In Maharashtra and Gujarat the organisation is under the control of Chief Engineers whereas in U.P., it is under the Department of Public Works of the State Government. In Mysore, a Technical Audit Cell has been located in the Directorate of Anti-Corruption and Technical Audit.

In other departments also, the principle of technical examination has been introduced in one form or the other. In the Central Ministry of Irrigation and Power, Quality Control Organisation has been set up for each major project. For large projects, this Organisation is under the Control Boards set up for such projects. For other projects, it is under the control of Chief Engineers.

In the Railways, Vigilance Cells have been created in each Zonal Railway and they work under the control of Chief Engineer.

4.4. Opinion of other Committees on the functioning of Technical Examiners' Organisation.—The future of the Technical Examiner's Organisation has been the subject of examination by numerous high level Committees which have expressed diverse views on the subject.

The Public Accounts Committee in their report on the Accounts of 1947-48 (post partition) and Appropriation Accounts (Civil) of 1948-49 have stated that "the system on the pattern of administrative audit in vogue in the M.E.S. should be introduced in all the major spending departments of the Government of India such as the C.P.W.D."

The M.E.S. Review Committee which was convened under the Chairmanship of the Deputy Defence Minister and included representatives from Finance and C.P.W.D., came to the conclusion in their report published in 1957 that "an independent organisation of the C.T.E. in its present form being superfluous should be abolished. The work relating to scrutiny of contracts at present performed by C.T.E. should be transferred to the Chief Surveyor of Works. The inspection of works should be undertaken in a more intensive manner by senior Engineer Officers".

The Estimates Committee in their 25th Report on the Defence Services published in 1958 have recommended the setting up of an independent organisation of Technical Examiners to serve as a common agency for all works organisations under the Central and State Governments.

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4.5. It is in the context of these conflicting views that the Panel has considered this subject. Numerous studies of the working of the technical examiners' organisation in the engineer departments have been carried out and the Panel also had the benefit of discussions with engineers and chief technical examiners. By and large, the charter of duties of technical examiners' organisation follows the same pattern. Their duties cover broadly the site check of works to ensure that these are executed according to the design and specifications and that bills are prepared on the basis of quality and quantity of work actually carried out. In some departments technical examination is extended to cover the specifications and administration of contracts as well.

4.6. Achievements of Technical Examination.—Coming to the achievements of technical examination, we would say that it has succeeded in bringing to light certain lapses on the part of the executive agencies in the execution of works and payments made therefor. We have studied several cases where as a result of the scrutiny done by the Technical Examiners certain recoveries were effected from the contractors. A statement of the total recoveries effected in C.P.W.D. and M.E.S. during the last few years is given below :

C.P.W.D.

Year	Workload	Amount of over-payments as assessed by C. T. E. (Amount in lakhs)	Amount of over-payments agreed to by the Deptt. (Amount in lakhs)	Percentage of agreed over-payments with reference to workload
1	2	3	4	5
1957 (6/57 to 12/57)	12 crores	3·16	0·61	0·05%
1958	21 crores	8·76	3·50	0·17%
1959	24 crores	8·84	5·27	0·22%
1960	27 crores	15·38	9·74	0·36%

M.E.S.

Year	Workload	Amount of over-payments as assessed by C. T. E.	Percentage of over-payments with reference to column 2
1	2	3	4
1957	20 crores	1,54,516	0·077%
1958	21 crores	1,34,660	0·06%
1959	23 crores	1,62,482	0·076%
1960 (up to June 1960)	12 crores	68,242	0·056%

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4.7. Points in favour of Technical Examination.—As stated in the preceding paragraphs, the probe conducted by technical examiners resulted in the disclosures of certain overpayments. For this reason a section of official opinion is strongly in favour of this organisation. It has been claimed that it is only by such systematic examination that excess payments will be discovered and substantial amounts saved. Further an organised check on quantity, specifications and performances goes a long way to secure the best value to Government for the money spent. The moral effect of such checks is obvious. They act as effective deterrent against malpractices. It is not always possible for the executive charged with the responsibility of executing projects in short time spans to attend to all matters at top speed. There is need for an outside organisation to assist Government in making an objective assessment of the quality of work and performance of contracts.

4.8. Points against Technical Examination.—On the other hand, the critics of Technical Examination have stated that such examination is superfluous and cannot be sustained unless the examiner himself is the supreme technical authority, which is not possible, except by erosion of the authority and responsibilities of the Chief Engineer. It is not uncommon that there are sharp differences of opinion between the Chief Engineer and the Chief Technical Examiner over the findings of Technical Examiner's teams, which cannot be resolved easily even by reference to higher levels. Further, continued probe by external agencies tends to sap the enthusiasm of the executive agency, curbs initiative and cramps managerial ability. A natural corollary of reluctance to brave the risk of assuming responsibility on the part of the executive is the tendency to play safe and avoid improvisation or innovations which cannot but have a most deleterious effect on efficiency and economy of works.

4.9. Our Observation.—We have given considerable thought to the benefits resulting from technical examination and also to its attendant disadvantages. We have tried to assess the value of savings in monetary terms effected through the detection of excess payments. We find that the amount actually saved bears only a small proportion to the total expenditure incurred. For example, in the C.P.W.D., the maximum amount recovered during the year 1960 was Rs. 9.74 lakhs against the expenditure of Rs. 27 crores in that year which works out to only 0·36%. The corresponding figure for the M.E.S. is Rs. 1,54,516 against the expenditure of Rs. 20 crores which works out to 0·077%. Some of these recoveries gave rise to a number of protracted arbitration cases involving considerable time, expense and effort on the part of the department. The net advantage to Government in economic terms from the recovery of overpayments indicated by technical examination was therefore somewhat problematical. We have also not come across adequate data to substantiate the claim that technical examination has helped Government to secure the optimum return for its financial outlay. In fact, constructional costs have invariably gone up in anticipation of the probe by Technical Examiners Teams, as the contractors have thought it prudent to inflate their rates in advance to cover up such recoveries as might be ordered by technical audit during the course of execution of the work or even long after its completion.

4.10. Partly the increase in rates tendered by the contractors represents compensation for the sense of uncertainty which has come to be engendered by the operation of the technical examination in all building contracts. The moral effect of technical audit as a deterrent against malpractices has been generally conceded, but considering the other side of the picture we feel that such checks would yield real dividends only if they were ingrained in the system instead of being imposed from outside.

4.11. Having considered all aspects of the matter, we have come to the conclusion that the benefits of the technical examination in its present form are hardly commensurate with the expenditure incurred on this organisation.

4.12. Our recommendations.—We are alive to the fact that lapses frequently occur in the course of execution of works, payment of bills and enforcement of conditions of contract. But we feel that the remedy for these lapses lies not in the sporadic inspection and check by an external organisation but in evolving measures for strengthening the organisation from within. At the cost of repetition, we would mention that the basic reasons for lapses on the part of the executive are excessive work loads, lack of powers, paucity of trained staff, unrealistic specifications and absence of up-to-date and comprehensive Schedules of Rates. We have recommended elsewhere equitable work loads for the various departments and evolved a revised schedule of powers, which will vest the officers with more authority to deal with all situations in an expeditious manner. We have also initiated work on the preparation of a comprehensive Schedule of Rates for different zones of the country. We also recommend that a cell should be formed in the Planning Commission with a view to co-ordinating the efforts of engineer organisations in the various zones in preparing such a schedule and later on in keeping it up-to-date.

4.13. Elsewhere in the report we have elaborated upon the importance of work study in simplifying and systematising work and recommend the setting up of work study wings in all engineering departments which would be responsible for continuously evaluating works and works procedures. The "expertise" gained by this wing should be systematically made available to projects so that some of the factors which make for delay, increase in cost and lowering of standards could be eliminated at the appropriate stage.

4.14. When the above measures are adopted, we should be able to eliminate the factors which are responsible for certain lapses in the execution of works. When this is done, the need for technical examination will be correspondingly reduced.

In coming to this conclusion, we have given thought to the record of economics resulting from technical examination and also to adverse effects it has on the initiative sense of responsibility and capacity for leadership of officers working on projects. We should like to make a firm recommendation that the existing organisation for technical examination as such should be abolished and replaced by measures for strengthening of public works organisation from within as suggested above.

5. STORES

5.1. Importance of material budgeting.—In the Chapter on "Planning of Works" we have referred to the formation of material budgeting cells in the States and Central Engineering Organisations and a Central Cell in the Planning Commission for collecting and collating data regarding the requirements of materials and equipment for the plan projects and their availability. We would like to emphasise that if we do not take active measures for the budgeting of materials and equipment we shall not be in a position to attain the targets set up in the Plan.

5.2. Issue of Stores to contractors.—Time and again an issue has been raised whether stores should be issued to contractors or they should be asked to procure these. The advantage in the latter procedure is that the departments save considerable time and labour involved in the procurement, custody, issue and accounting of stores. We have examined the issue and are of the opinion that in the existing circumstances where some of the important materials are in scare supply, it will be difficult for the contractors to procure such materials without government assistance. Suggestions have been made in certain quarters that contractors may be issued permits and priority quota for the required quantity of materials so that they could procure the materials themselves. We have considered these suggestions and are of the view that in the existing circumstances where materials are scarce, and transport is difficult, the Government Department should take prior action for procurement of materials so that they are available on time. Issue of priority quota and licences to contractors will not serve the purpose for items which are scarce or for which the lead time is long. It is, however, not advisable on the part of the Government Department to store other items for issue to contractors. The procurement and storage of items readily available should be restricted to departmental use.

5.3. Organisation for Stores.—Normally Executive Engineers procure the stores on required basis for each project and dispose of the surplus materials after the closure of work. In the Central Public Works Department, there are three stores divisions in Delhi which procure stores and issue materials for all the working divisions there. In the M.E.S., there is a well-knit system of stores organisation at all levels.

In the lack of an adequate organisation for stores, it becomes difficult to plan the requirements properly, procure them timely and economically and ensure a smooth supply to works. Our case studies also show that where accounts of works have not been closed long after completion, one of the reasons given was the difficulty of disposing of surplus material.

Considering these, we recommend that stores divisions or stores sub-divisions may be set up at places of concentrated construction activity.

5.4. Stores Management.—The success of stores management depends to a great extent on the control of stocked items that one is liable to exercise. In recent times, stores management has developed into a science known as inventory control. The primary objectives of inventory management are:

(a) to minimise stock-out and consequent stoppage of works,

(b) to keep down capital investment in inventories.

Our studies have indicated that the major bottlenecks in the execution of works are non-availability of materials at the correct time. In order to avoid stoppages of work due to non-availability of materials, it is necessary to maintain stock and ensure their smooth flow. At the same time it should be realised that over stocking will lead to idle investment and in addition may cause further loss due to obsolescence, deterioration, storage cost etc. A balance has to be struck and the stock level has to be so kept (optimum level) that stoppage of works is minimised to a desired level and at the same time over investment is avoided.

There may be a large number of items of stock and it may be neither feasible nor desirable to exercise the same degree of control over all of them. For selective and purposeful control, an analysis known as A.B.C. analysis should be made. In this analysis, store items are divided into three categories :

A Items—The few major items that tie up most of the inventory investment.

B Items—Those of secondary importance.

C Items—The numerous but inexpensive items that make up only a minor portion of the inventory investment.

The value of such analysis is that it enables selective control on items. Obviously "A" items require the tightest control and this can be done by relaxing control on "B" and "C" items. In respect of "A" items, stocks should be held as low as possible and careful attention must be paid to the assessment of their requirements, scheduling of deliveries and ensuring prompt flow.

Normally in Stores organisation, there is a build-up of items which do not move fast. This ties up capital and the inventory carrying cost also becomes quite considerable. A continuous evaluation of stock material is necessary to identify the fast moving items, slow moving items and non-moving items, to take timely action to dispose of the non-moving items if they are not required for a considerable amount of time, and to reduce the outlay on slow moving items by either reducing their stock level or making any such alternative arrangement.

5.5. Procurement of materials.—With the setting up of a Central Stores Organisation, procurement is the responsibility of the engineer-in-charge of it. Still, there will be certain items which Divisional Officers may have to purchase themselves. Their powers for making such purchases are quite limited and vary from State to State. We have gone through the powers obtaining in different States for different levels of officers and recommend the enhancement of powers in the way detailed below. These have been incorporated in the Schedule of Powers *viz.*, Appendix XIII.

Chief Engineer.—Where there is a separate organisation to deal with government purchases: Rs. 10,000 per item per purchase without any overall annual limit; otherwise, full powers.

Superintending Engineer.—In case where there is a separate organisation to deal with government purchases: Rs. 5,000 per item per purchase without any overall annual limit; otherwise, up to his powers to accept tenders.

Executive Engineer.—In case where there is an organisation to deal with government purchases: Rs. 1,000 per item per purchase subject to a limit of Rs. 10,000 per annum, otherwise, up to his powers to accept tenders.

5.6. Purchase of materials through a Central Organisation.—At the Centre, there is an effective Organisation in the D.G.S. & D. for the procurement and supply of materials to the various departments. Some State Governments also have Central Purchase Organisations but many of these are not adequately manned for purchasing different types of technical equipment and materials required by engineer organisations. Routing of Supplies in such cases through these organisations adds to delays. We, therefore, recommend that in such cases the engineering organisations may be empowered to arrange for their own supplies.

5.7. Codification and identification of Stores.—At present the sub-heads under the stock account are:

(1) Small Stores.
(2) Building Materials.
(3) Timber.
(4) Metals.
(5) Fuel.
(6) Painters' Stores.
(7) House fittings.
(8) Miscellaneous Stores.
(9) Land, Kilns etc.
(10) Manufacture.
(11) Storage.

This system is adopted in most of the State Governments. The type and number of materials that stores organisations may have to handle now are much different from what used to be years back. Codification on modern lines is definitely called for. At present there are two broad systems of classification and codification *viz.*, (a) alphabetical system; (b) decimal system. For public works stores a combination of the two seems desirable. Alphabets can be used for the material class and decimal used for the particular items in the class.

5.8. Stores Accounting Procedure.—The existing procedure followed by the Central and State P.W.Ds. has been indicated in a flow Chart (Appendix XV). The system has the following drawbacks :—

1. The form of Measurement Book is not suitable for recording measurements of supplies of material.
2. The stock accounts are not capable of giving daily balances without stock taking.
3. The existing forms of Abstract of Stock Receipts and Issues (C.P.W.A. Forms 9 and 10) are not suitable for accommodating large numbers of items. The transactions in the present days are so large that it is very difficult to prepare them in duplicate which has to be done in manuscript.
4. The preparation of the Abstracts of Receipts and Issues is itself a lengthy process.
5. The present system of fixing issue rates every half year on the basis of market rates entails considerable labour.
6. The system of pricing and verification of stores is cumbersome.
7. The closing of the Stock Registers every half year involves copying of thousands of items.
8. The discrepancies between the book balances and ground balances are not reconciled promptly as the balances are known only after the completion of the Half Yearly Registers of Stock.
9. The existing form of indent provides for quantity indented and if the material is not available, these quantities have to be changed. This results in confusion.
10. The stock accounts do not indicate surplus, dead and unserviceable stores, resulting in unnecessary locking up of Capital.

5.9. To overcome the above shortcomings we are recommending a revised procedure for store accounting which is briefly described below:

Receipt of Stores : Goods Received Sheets.—All materials received should be examined, counted, weighed or measured as the case may be when delivery is taken. They should then directly be taken in the Goods Received Sheets in lieu of recording in Measurement Books. The Goods Received Sheets will be printed in the form of booklets duly machine numbered. The Goods Received Sheets should be prepared in triplicate by carbon process using indelible ink or copying pencil—one copy for retention with the Store Keeper, second for the Sub-divisional Office for preparing Abstract of Stores Received and the third copy for making payments and posting Stores Ledger in the Divisional Office.

Issue of stores.—The indenting division will prepare the indent in quadruplicate in carbon process. One copy of indent will be retained as Office copy and three copies presented to the Stores Division for issue of stores. The form of the indent will have separate columns for quantity indented and quantity issued.

The store keeper will issue the material and hand over one copy of indent to the representative of the indenting division and retain two copies of the indents with him.

Goods Issued Sheets.—From the indent, the store keeper will prepare Goods Issued Sheets. This will also be prepared in triplicate and sent to the Sub-divisional and Divisional Office for preparing the Abstract of Stores Issued and posting the Stores Ledger respectively.

Use of Stock Record Cards.—Stock Record Cards will replace the Register of Stock Receipts and Issues and Half Yearly Return of Stock (Form 11) in the Sub-divisional Office. These cards will be posted from the Goods Received Sheets and Goods Issued Sheets and will show in a chronological order the receipts, issues and the running balance.

Stores Ledger.—In the accounts branch, a Stores Ledger would be kept in which all items of receipts and issues will be entered from the Goods Received Sheets and Goods Issued Sheets. The Ledger will be posted daily by quantities only and pricing will be done at the close of the month. This Ledger will form the fundamental basis for the reconciliation of the receipts, issues and balances of stock as it would be posted independently of Stock Record Cards from the Goods Received Sheets and Goods Issued Sheets.

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The Stores Ledger will replace the Half Yearly Register of Stock (Form 12) and will be a continuous record.

Abstract of stores received and issued.—There forms will be prepared by the Sub-divisional Officers in a simplified form as hitherto and will be sent to the Divisional office at the close of the month for financial adjustments.

Division-wise ledger.—A Division-wise ledger should be kept in the Stores Division which will indicate the amount due from a particular divison to whom stores have been issued.

Issue Rates.—The existing methods of reviewing issue rates every half year on the basis of market rates involves lot of clerical labour and consumes much time resulting in the review not being completed even months after the close of the half year. As no useful purpose is served by such review, we recommend that issue rates should be reviewed yearly or in between only if there is any material variation or violent fluctuation in rates.

The flow chart of the revised procedure is given in Appendix XVI.

5.10. The advantages of this procedure of store accounting are:

(1) the preparation of Goods Received Sheets and Goods Issued Sheets will facilitate completion of the stock records daily;

(2) the bills of suppliers will not be delayed as the payment will be made on the authority of Goods Received Sheets by the Divisional Officer without reference to the Sub-division;

(3) the maintenance of Stock Record Cards will give at a glance the daily stock position. This again will facilitate continuous stock taking and reconciliation of discrepancies between the book balances and ground balances;

(4) the maintenance of Stores Ledger will indicate the quantity of stock available at any time and will help in having effective control over material budgeting;

(5) there will be no necessity to carry over the balances every half year and the clerical work involved will be curtailed to a great extent as the Stores Ledger will be a continuous record;

(6) the Ledger will also indicate surplus stores at a glance and effective measures can be taken by the Divisional Officer to dispose of such stores;

(7) the revised form of indent would eliminate the risk involved in keeping the invoice blank or scoring out the indented quantities;

(8) delay in verification of the A.T.D. will be minimised by sending one copy of the indent to the indenting division along with the stores;

(9) a watch over the recovery from the divisions will be facilitated by the maintenance of a Division-wise ledger.

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6. ACCOUNTS AND AUDIT

6.1. A comparative study of the existing systems of accounting procedure in the various departments revealed that there were three distinctive patterns available in the country.

(1) **C.P.W.D. and State P.W.Ds.**
(2) M. E. S.
(3) Railways.

These distinctive patterns are an outcome of gradual evolution suited to the working conditions, staff pattern, works load etc. of each department. Any attempt made to unify all these accounting systems under one pattern may not yield fruitful results. Keeping this in mind. we have preferred to divide this chapter into two sections. the first dealing with Central and State P.W.Ds. and the second with the M.E.S We are not commenting upon the system prevailing in the Railways.

SECTION I

6.2. Central P.W.D. and State P.W.Ds.—The account rules for public works were formulated in the year 1908 in the form of a compilation called "Public Works Department Code". These were modified by the Government of India in 1918. The existing accounting pattern retains its fundamentals from that year.

6.3. The need for separation of accounts and audit.—Under the existing pattern, the Divisional Officer is the primary disbursing officer in the department. Accounts are compiled under his supervision and are sent to the Accountant General for audit and incorporation in the General Accounts. The Accountant General has the dual functions of accounts and auditing. With the increase in the number of works and in the number of Public Works Divisions, the process of final adjustment in the government accounts especially in the case of interdepartmental transactions under the present system takes a long time. Further, quite a good amount of duplication is there in the Chief Engineer's office in compiling the figures of expenditure from the returns obtained from various divisions in order to facilitate effective control of the Chief Engineer over expenditure consistent with the voted grants. Considerable amount of additional work is involved in effecting reconciliation of figures in the accounts kept by the Chief Engineer's office and those in the Accountant General's office. The preparation of Appropriation Accounts is naturally delayed and involves quite a good bit of avoidable correspondence and office work. To obviate these, it seems advisable to separate the accounting procedure from the auditing and keep the former (Accounting and Primary Audit) with the Chief Engineer. Incidentally this will also reduce considerably the office work involved in the divisions in preparing monthly accounts and some other documents as only some abstracts will be sent to the Controller of Accounts working under the Chief Engineer.

The auditing can be done frequently through audit parties by the Accountant General and this will further reduce the extent of unnecessary queries which now come up due to the system of sending several types of returns to the Accountant General while the initial documents are retained in the divisional office.

6.4. When once the accounting function is given to the Chief Engineer, it becomes essential to create an organisation for it. A Controller of Accounts with suitable staff will be attached to the Chief Engineer and will be responsible for compilation of accounts and rendering of advice on financial matters to the Chief Engineer. Further, he can have a small unit for cost accounting so that costing of works can be done as and when necessary to help the planning and work study units which we are recommending to be set up in the Chief Engineer's Office.

6.5. At the divisional level, an S.A.S. Accountant may be posted in place of Divisional Accountant. He can relieve to some extent the routine work of the Executive Engineer. We have heard a lot of complaints about the routine work taking up more than 75% of the Executive Engineer's time. This, everyone will agree, is not conducive to the proper and efficient management of works. In a case study done of a construction division, the office work of the Executive Engineer was as much as 5½ hours per day and in a maintenance division it was 7 hours per day. This makes it well nigh impossible for the Executive Engineer to devote adequate attention to supervision of work which is very essential for economy and efficiency. To relieve the Executive Engineer of some of the routine work, some functions can be delegated to the S.A.S Accountant. We have given in Appendix XVII the type of work that can be thus delegated.

6.6. Separation of works and accounts.—There has been some thinking on the line that accounts and works may be bifurcated as is prevalent in Railways. We have considered the matter in detail and find that for Public Works Departments, the system will not be workable. Scattered as the Public Works Divisions are, over a large area and catering as they do to several departments, the bifurcation of accounts and works will create more difficulties and ultimately retard the progress of works.

6.7. Administrative control of the Accounts Staff.—At present, the Divisional Accountants are posted to the divisions by the Accountant General and he is administratively responsible for them. This results in dual control over the Divisional Accountant by the Accountant General and the Executive Engineer which is not conducive to efficiency. Further, there are complaints about the frequent transfers of Divisional Accountants which cannot but adversely affect the work in Public Works Divisions. These deficiencies will be mitigated in the proposed system as the accounts staff will be under the control of the Chief Engineer

6.8. Training of accounts personnel.—There is no denying the fact that there is a great dearth of experienced and trained personnel in accounts matters. The training of accounts clerks is not being given due importance. We recommend (a) training for accounts clerks and (b) compulsory departmental examinations in accounts. It is equally necessary to give some training in accounts to the executive staff.

6.9. Simplification of accounts.—In almost all the States, there is considerable backlog of accounts returns and the public works accounts are not kept up-to-date. There arises a series of correspondence with the Accountant General which adds to work. This situation is mainly due to the cumbersome procedure of public works accounts and an enormous increase in the volume and pace of work. Proper maintenance of accounts is a *sine qua non* for the efficient execution of public works but this can be done only when the procedure is simplified. We have given considerable thought to this matter and we deal here with some of the points susceptible of simplification.

6.10. Payment of bills to the suppliers of materials and equipment.—The present procedure is to obtain equipment and materials mostly through the central organisations like the D.G.S. & D. in the Centre and Supply or purchase departments in States. The procedure of payment at the Centre has been studied in some detail and the flow chart, in Appendix XVIII, indicates the process of payment and adjustment in books. The process is so cumbersome that adjustments take inordinate time. An illustrative case is given below :

Adjustment of Debits passed on by the D. G. S. & D.

Date of Railway Receipt	1-2-60
Date of receipt of material	5-2-60
Date of Settlement Account of Pay and Accounts Officer	
90% bill	8-3-60
10% bill	8-6-60
Date of Accountant General's Adjustment Memo.	
90% bill	17-8-60
10% bill	27-10-60

The outstanding balance under suspense heads runs into crores of rupees. In Central Public Works Department alone, the outstanding balance under 'Purchases' up to the year 1960-61 was of the order of Rs. 10.5 crores. This is mainly due to delay at the different stages indicated in the flow chart. Further, there is possibility of original vouchers being lost in transit or mismarked to other offices in the accounts departments. To avoid delay in the adjustment, we suggest that the payment may be made by cheques to the suppliers directly by the Divisional Officers. This practice, however, may not be very convenient from the suppliers' point of view as they have to watch payment from a number of Divisional Officers. But this is a difficulty which is not insurmountable. In case, however, this is not acceptable, we would suggest that the payment may be made by cheques to the Accounts Officer of the D.G.S. & D. Steps in the revised procedure are also given in the Appendix XVIII and will indicate the simplicity of the procedure.

6.11. Adjustment of debits from Railways.—The adjustment of debits received from Railways also passes through more or less the same process and takes two to three years before the debit goes to the respective Divisional Officer for adjustment. To obviate this difficulty, we recommend that payment be made to the Railways by cheques and the system of issuing credit notes stopped. We are glad to say that the Railway Ministry have accepted this proposal and have already issued orders to this effect. We strongly recommend that this system be followed. The original and proposed procedure for adjustment of Railway freight is given in Appendix XIX which will make the matter clear.

6.12. Items under transfer between P. W. Officers.—Inter-divisional transactions between Public Works Departments, whether these are regarding supply of material or rendering of services, are adjusted through book transfers. The debit is raised by the originating division for the supplies made and services rendered which is to be accepted by the other divisions. In the Audit Office, the transfer transactions of this class are paired and the settlement of items awaiting adjustment is watched by means of a broad-sheet.

This system of raising debits could have worked well when the transactions were a few but at present when the number of transactions is large, the system of book adjustment has almost failed. The balances outstanding under this head in the broad-sheet of the Accountant General run into crores of rupees. A possible remedy for this situation is to pay by cheques which will enable the adjustments to be made as and when the transaction takes place. The cheque forms for these transactions could have a distinct marking in order to distinguish them from ordinary cheques issued to contractors and suppliers.

6.13. Sub-head Accounting.—Under the present rules, for works costing over Rs. 20,000 separate accounts are required to be maintained for each sub-head estimated to cost not less than Rs. 2,000 and the remaining sub-heads are lumped together. The posting of accounts in this way is difficult and cumbersome. In many of the divisions this work is in arrears.

Posting of accounts sub-headwise is necessary for effecting financial control of the cost of the work by their components. Where works are carried out by contractors on lump sum basis, sub-head accounting does not serve any purpose. Where works are carried out by contractors on item-rate contract or percentage rate contract system, this can be dispensed with, as the bills themselves exhibit up-to-date quantities, rate and amount spent on component parts. Where, however, the works are done departmentally or where contract is for labour only, sub-headwise accounting may be necessary; but even here we would recommend such system of accounting only for works costing more than Rs. 50,000. The limit of each sub-head accounting also can be raised from Rs. 2,000 to Rs. 5,000.

Incidentally we find that at present major works are defined as those costing more than Rs. 20,000. In some States, this limit is as low as Rs. 10,000. We recommend that as a corollary to the above arrangement, the limit of major works may also be raised to Rs. 50,000 in view of the increase in cost of material, labour etc., which has taken place in recent years.

6.14. Material at site accounts (M.A.S. Accounts).—An account of all departmental materials which are brought to the site of works is kept in the "Material At Site Accounts" form. This account shows receipts and issues of materials as the transactions occur. At present the M.A.S. accounts are required to be kept both by quantity and value in the case of works whose accounts are kept by sub-heads and only by quantity in other cases.

The preparation of the M.A.S. accounts involves considerable labour and we have found that these accounts are not maintained in most of the Public Works Divisions. Further these accounts are seldom made use of. We have, therefore, come to the conclusion that M.A.S. accounts need be maintained only in the case of major works executed departmentally or through contracts where the contract is for labour only. Even in these cases, only a numerical account may be kept for which a suitable form may be devised.

6.15. Account Returns.—Account returns submitted by the Divisional Office fall into two categories:—(a) those sent to the Accountant General, and (b) those sent to higher authorities in the department itself. In the first category, the number of returns submitted with the monthly account is about 27. Among these returns the copying out of Contractors' Ledger, Register of Deposits, Purchases, Miscellaneous Public Works Advances, Register of rent of Buildings and Lands entails heavy clerical work. It is, however, gratifying to note that recently the Comptroller and Auditor General has simplified some of the returns, and the preparation of some of the schedules has been altogether dispensed with. We, however, consider that there is still some scope for further reduction of clerical work. The submission of Schedules of rent of Buildings and Lands and Extract from Revenue realised with monthly accounts could also be dispensed with.

The number of returns in the second category depends on the administrative instructions within the department itself and naturally varies from State to State. Our studies show that in one department these comprise nearly 23 monthly returns, 17 quarterly returns, 21 half yearly returns and 33 annual returns. We feel that there is scope for reduction in the number of these returns.

Further, if our recommendations for separating Public Works Accounts from audit is accepted, the number of account returns which are now being submitted to the Accountant General will obviously be curtailed. Most of the documents will be in the divisional office and these can be audited by audit parties or higher officers in the department itself, and the need for extracting from them and preparing a number of returns which consumes lot of time of the divisional office will be minimised.

6.16. Capital and Revenue Accounts for Residential Buildings.—The Accountant General prepares Capital and Revenue Accounts for residential buildings with a view to reviewing the financial results of the year. In the case of a commercial enterprise undertaken by a Public Works Department, it may be appropriate to keep Capital and Revenue Accounts but for residential buildings which are in large numbers and which are not strictly of a commercial character, such an account will entail considerable amount of labour and may not be commensurate with the results achieved. We therefore recommend that the preparation of Capital and Revenue Accounts may be dispensed with.

6.17. Setting up of Working Group for simplification of Public Works Account Code.—The Committee on Administration which has been recently set up by the Central Cabinet for promoting administrative efficiency has also been considering measures to bring about improvements in Accounting Procedure. At its instance, the Government has set up a Working Group under the Chairmanship of Shri A. K. Mukherji, Additional Deputy Comptroller and Auditor General for simplifying the Central Public Works Account Code.

Some members of our Panel are members of the Working Group. We hope that this Group will give due consideration to our recommendations in working out the details.

SECTION II

6.18. Military Engineer Services (M.E.S.).—The organisation and procedure for accounting in the M.E.S. differ from those of Central and State P.W.Ds., in that (a) the Unit Accountant who is analogous to the Divisional Accountant is an S.A.S. qualified accountant, (b) he is under the direct control of the Controller of Defence Accounts, and (c) any difference arising between the Garrison Engineer and the Divisional Accountant has to be referred to the Controller of Defence Accounts for a ruling. As the accounts of public works are initially compiled in the divisional office, the need for strengthening the accounting unit in this office need not be specially emphasised. The prevailing system in M.E.S. of appointing S.A.S. qualified officials as Unit Accountants has proved satisfactory. We have also recommended earlier that the State and Central P.W.Ds. should follow this example. The other two features which distinguish the M.E.S. accounting set up have worked against speedy execution of works. As the Unit Accountant is not under the control of Garrison Engineer and as any difference between the two has to be referred to the Controller of Defence Accounts for a ruling, the works often get delayed. We do not see any reason why the system prevailing in P.W.Ds. should not be applied in M.E.S. as well. We recommend that the Unit Accountant should be placed under the administrative charge of the Garrison Engineer, though he may continue to belong to the cadre of the C.D.A. and that the Garrison Engineer should have powers to over-rule him, where necessary, in the interest of work.

Another point in the accounting system which has struck us is the numerous stages through which final bills have to be processed for payment. In addition to check by the Surveyor of Works, the bill is checked by Divisional Accountant and again checked by C.D.A. We consider that a check at the Unit Accountant's level as is prevailing in P.W.Ds. is more than adequate. Statistics collected from three divisions of the M.E.S. for the past four years show that the savings effected by the C.D.A.'s check after the initial check of the Unit Accountant was 0.04% of the gross value of the bills checked. We are convinced that duplication of checks is unnecessary and that the delay in the payment and the consequent increase in tender quotation may more than offset the paltry savings that may accrue due to such checks. We, therefore, recommend that the bills should be paid soon after relevant checks have been exercised by the Unit Accountant as is the practice in P.W.Ds.

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7. ORGANISATION AND ADMINISTRATION

7.1. Engineer Officers working in the various States and departments of the Central Government at present belong to numerous organisations or cadres, each having its own conditions of service and scales of pay. In certain States, State Governments have prescribed different rules of recruitment and conditions of service for allied branches of engineering such as Highways or Public Health. There is also the tendency in some Ministries/Departments to set up their own miniature engineer organisations where a comparatively junior engineer officer virtually functions as a Chief Engineer.

In view of the tremendous developmental activity that the country has undertaken, it is essential that the engineering organisations of the country are integrated as far as possible, so that the best technical talent of the nation can be effectively deployed for carrying out onerous tasks.

We consider it of prime importance that the Indian Service of Engineers is re-established as early as possible and we are happy that steps in this direction have already been taken by the Government.

In addition, we consider that there should be for each State one unified Service of Engineers for all branches of engineering; and that the scales of pay and conditions of service should as far as possible, not differ from one State to the other.

The tendency to set up separate miniature Engineer organisations in Ministries/Departments undertaking construction jobs should be discouraged; instead the P.W.Ds. should be suitably strengthened to cope with the additional load.

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7.2. From the very inception of the P.W.Ds. in 1849, the Chief Engineers were both technical and managerial heads of their departments. They had direct access to the head of the Provincial Government and were vested with considerable authority. It was only in 1926 that the first change occurred, when the Chief Engineer, in the province of Madras, ceased to be a Secretary to Government. Bengal followed suit in 1927 and other States followed, mostly after the introduction of constitutional changes in 1935. At present only in Assam the Chief Engineers are Secretaries to Government in the respective departments. In Maharashtra and Gujarat the State Chief Engineers are joint Secretaries. In West Bengal the Chief Engineer functions as part of the Secretariat but he has no secretariat status. In the remaining States the office of the Chief Engineer is separate from the Secretariat. In Madras, Andhra Pradesh and Mysore, the senior most Chief Engineer is designated Chief Engineer (General) in which capacity he deals with all general matters relating to policy and establishment, in addition to his normal technical duties.

7.3. We have carried out studies in some of the States and also in the engineer organisations of the Central Government. Everywhere we got an impression that Engineer Officers are seriously hampered in the discharge of their duties owing to numerous restrictions and obstacles which are inherent in the present administrative set-up. For instance, new techniques or equipment which in the course of normal engineering development have proved their utility are not cleared by the Secretariat except after long time-consuming discussions with a hierarchy of officers and laborious notings on files. Needless to say this state of affairs leaves little scope for the exercise of initiative by the executive agency.

7.4. We have made a series of case studies. One conclusion which emerged uniformly from such studies is that the contribution of the secretariat on cases submitted by a Chief Engineer was very limited. On the contrary, disposal of cases was delayed and a great deal of the Chief Engineer's time spent in explaining technical issues to his non-technical Secretary. Under the existing set-up the fortunes of a case do not necessarily follow the lines of purposive development. A proposal is worked up and processed at a certain technical level in the department. Thereafter it moves to higher levels in the same department for further scrutiny until it comes for final vetting and approval to the top rung of the Chief Engineer. It is at this stage that the proposal has become mature for reference to the Secretariat. But unfortunately this reference has to suffer a sharp vertical drop to the bottom rung of the Secretariat department until it starts moving from this point to middle and the higher levels of the Secretariat in course of normal processing. Needless to say, this 'N'-pattern of development is not only time-consuming but also a source of great annoyance and frustration to both the planning and the executive organisations.

The constructional tasks of the engineers are growing larger and larger with each successive Plan and the employment of modern techniques is essential. Technology is, however, advancing so rapidly that unless engineers have the freedom and initiative to adapt these techniques according to needs there is little chance of success.

7.5. Urgent action is, therefore, necessary to redefine the relative responsibilities of various levels of officials in the Government and to delegate authority to those on whom the responsibility for results rests. In this connection we consider it desirable to draw attention to the need for reorienting the concept of authority as commensurate with responsibility enunciated by the Planning Commission :

"For the execution of any programme or projects, the primary need is to fix specific responsibility on the agency concerned and, within it, on particular individuals. Within defined limits, each individual should be given full responsibility and, with it, the necessary measures of support and trust. If he fails in the discharge of his responsibilities, he should be replaced. But so long as he holds the office with which he is entrusted, he should accept all its obligations, and, equally, he should be placed in a position effectively to discharge them. With responsibility thus specified, it should be open to him to seek such advice and consultation as he may require, but these should not become the necessary ingredients of the executive process itself." (Chapter XVII Para. 5, of the Third Five Year Plan.)

7.6. We are convinced that as a first step to investing the executive agency with the authority for discharge of its responsibilities, the traditional concept of Secretariat as holding supervisory charge over and apart from the executive field organisations must be changed. There is no reason why the office of the Chief Engineer and the Secretary dealing with the engineering organisation should not be combined in the person of the Chief Engineer. Further, sufficient powers must be delegated to Ministries/Departments to enable them to function without constant reference to Finance. The Ministry of Finance of the Central Government has recently delegated some financial powers to other Ministries. We feel that it is a step in the right direction, but consider that similar delegation should be extended to the engineer organisations of all Central Ministries. A scheme of delegation of financial powers should also be introduced in the State Governments.

7.7. There is also the curious anomaly of some purely technical bodies in certain States being headed by civil administrators. Examples of these are the Electricity and Housing Boards. There is no reason for continuing the existing system. Placing technically qualified men in supervisory charge of technical organisation is not only a sound administrative practice but also a matter of sheer necessity if these organisations are to function with efficiency and despatch.

7.8. The proposal to make the Chief Engineer, Secretary to the Government has been the subject of considerable controversy for many years. We have given a great deal of thought to the problem and in particular to the reasons that are normally adduced against the adoption of such a measure. For example, it has been stated in support of the existing division of functions between the Secretariat and the Chief Engineer that:

(a) it relieves the engineers of a great deal of work involved in merely administrative duties and helps them to concentrate their energies on their proper technical work. If the engineers were not afforded this relief from administrative routine, the present shortage of technical manpower would be further aggravated.

(b) owing to the large expansion of scope and scale of engineering works, there has been significant addition to the charge and the posts of Chief Engineers with the result that there is hardly any State in which there are not more than one Chief Engineer of almost equal status. A Secretary from the administrative services is necessary to co-ordinate the functions and the work of one Chief Engineer with that of the other.

(c) the proposals and the schemes drawn up by the head of the Department, which in this case would be the Chief Engineer in charge of the public works and other engineering departments, are at present put up in the first instance, to the Secretariat. There is a distinct advantage in this procedure because the scrutiny of these proposals is done by experienced administrative officers objectively in a detached manner and having regard to the financial effect of the proposals and their due place in the overall plan of the Government. It has been often suggested that there are risks involved in adopting the alternative system in which the head of the executive organisation would himself be responsible for making a detailed examination of his own proposals. An engineer officer in his enthusiasm to secure sanction for his own pet schemes may tend to give undue emphasis to certain aspects and minimise certain real difficulties and endeavour to push through the project which may not on merits necessarily warrant a high priority in the overall plan of the Government.

Our comments on the above reasoning may be summarised as follows :—

(a) The existing arrangement is not necessarily conducive to providing any appreciable relief to the engineers from routine administrative duties. In effect, such routine work is carried out at somewhat lower levels in the Secretariat. There is no reason why the provision of suitable clerical assistance to engineer officers should not help to achieve the same objective. At present, a great deal of time of the engineer officer and his staff is spent in explaining technical matters to the administrative secretariat. It is only the proposed fundamental change of the system that would provide the necessary relief to the senior technical officers, in that the time now spent in oral or written briefs, discussions and explanations or elucidations for the benefit of the non-technical Secretariat would be saved. This would consequently lead to speeding up of work and economy of establishment.

(b) While the need for co-ordinating the work of the Chief Engineers in charge of different branches of engineering activity is obvious, it is not understood why it should be necessary to effect this co-ordination only through an administrative officer who has no technical qualifications and background. In fact, if co-ordination of technical work is to be effective and purposeful, it is necessary that the senior technical officer, who by training and experience is fully conversant with the problems of different fields of engineering activity, should be placed in charge of this vital function. On the other hand, if merely administrative officers with no experience other than that of general or revenue administration, are appointed to co-ordinate the work of senior engineers, as is the practice prevailing in several States, the co-ordination achieved is of doubtful value ; in effect, it serves to clog the administrative machinery rather than promote operational efficiency or harmony.

(c) While we fully realise the need and value of objective examination of schemes and projects both from the point of view of their financial effect and their relation to overall economy of Government, we feel there is no special "expertise" involved in such examination which may be considered as outside the province of an experienced engineer. An engineer of today, if he is to administer his charge efficiently, must be not only technically proficient but also be a good manager with sound knowledge of financial administration of projects, as also of their impact on the economy of the State.

It should not be difficult for a senior engineer officer to carry out an objective examination of a proposal for constructional works, especially when most of such proposals originate in the user departments and when proposals pertain to the engineer department itself, they are initiated at lower levels.

7.9. We do not, therefore, see any reason as to why the post of the Secretary to the Engineering Department should not be held by the highest technical authority *i.e.*, the Chief Engineer of the State. On the other hand, we feel that the combination of the two offices *i.e.*, that of the Secretary of the Department and the Chief Engineer in one person will lead to both economy of time and manpower and contribute to efficiency and speed in the execution of works. The other obvious advantages of this rationalisation will be unity of command and avoidance of unnecessary duplication of manpower and effort and a great deal of time consuming paper work which are the features of the existing arrangement. We are convinced that the implementation of the recommendation will promote speed, economy and efficiency which are so necessary today for the successful fulfilment of the plan programme.

7.10. Generally in every State, there is more than one branch of engineering *i.e.*, Irrigation, Buildings, Roads, Public Health Engineering, Electricity etc., headed by one or more officers of the rank of Chief Engineer. We suggest that where there is more than one Chief Engineer in the branch, the senior Chief Engineer may be appointed to be in overall charge of that branch. If any of these branches has to be constituted into a department of Government, the senior Chief Engineer of that department will also be Secretary to Government in that department. In States where all or more than one branch of engineering are included in the charge of a department, the senior most of the senior Chief Engineers of the branches in question should be appointed as Secretary to the Department. In other cases, where an engineering branch forms part of a non-technical department, as for example, public health engineering branch forming a part of the department of Health, the senior most Chief Engineer of that branch will function as Additional Secretary in that department directly responsible to the Minister for his charge.

In the Central Ministry of Works, Housing and Supply, which is concerned with subjects other than works, the senior Chief Engineer of C.P.W.D. should be appropriately appointed as Additional Secretary to Government in that Ministry.

7.11. Formation of a Board of Engineers in each State.—We had occasion to mention earlier in the report, that there are various branches of Engineering and a number of Chief Engineers within each branch. For example, in one State there are 18 Chief Engineers of which 8 are for Irrigation, 3 for Buildings and Roads, 5 for Electrical, 1 for Public Health Engineering and 1 for Highway Engineering. In some States, Officers of the status of Chief Engineer are appointed as Directors of Technical Education, Housing Boards and Inland Water Transport. Each Departmental Chief, however, works in isolation from the others with the result there is little co-ordination among the engineering departments in the State. This leads to over-lapping of efforts in certain fields of activity and conçurrently to utter neglect of vital jobs in other fields. The resources of the State are also often not utilised to the maximum, as for example, certain stores and equipment may be surplus to the requirement of one Chief Engineer whereas work under another Chief Engineer may be held up for want of the same materials and equipment. The administration of technical personnel and their training is also neglected as there is no centralised agency to plan and organise programmes of recruitment and training.

There is at present no machinery in the States for pooling the technical data and experiences with a view to drawing up an integrated plan of development which will include judicious allotment of priorities, assembly of resources with reference to the need of the project, drawing up a realistic programme of execution and keeping a watchful eye on performance. This glaring deficiency has been brought home to us by Senior Government Officials, technical experts and important members of the public.

7.12. It is in this background that we recommend the setting up of a high powered body of technical experts *i.e.*, a Board of Engineers for each State charged specifically with the responsibility of co-ordinating all engineering activities and tendering expert advice from day-to-day on all important technical and other allied matters affecting the development of the State.

7.13. Constitution & functions of the Board.—Our outline proposals as regards constitution and functions of the Board are given below:

The State Board of Engineers will consist of the senior Chief Engineers of each branch of engineering in the State and include Chief Engineers appointed as Directors of Technical Training, Housing Boards, Inland Water Transport, etc.

The Board will be presided over by a fulltime Chairman who will normally be the senior most Chief Engineer of the State. It will, however, be desirable to ensure that this Officer should have put in at least two years active service as Chief Engineer in one of the engineering branches.

The Chairman of the Board will be the Chief Technical Adviser to the Government and will have a small secretariat of permanent whole-time staff to assist him in his functions.

The broad functions of the Board will be:

(a) to assist the Government in the drawing up of the State development plans and to make an assessment of the resources required.

(b) to advise the Government on all major technical schemes of an inter-departmental importance.

(c) to co-ordinate engineering research and development.

(d) to deal with matters relating to broad policy on works, establishment, contracts and other general matters.

(e) to co-ordinate utilisation of stores and plant.

We suggest the following broad branches in the proposed Secretariat of the Board:—

I. *Planning and Co-ordination Branch*

(a) To study all major technical problems of inter-departmental character.

(b) Co-ordination of work of different branches of engineering in the State.

(c) State development projects and periodical review of their progress.

(d) Assessment of material and equipment requirements of the State plans and their rational utilisation.

(e) Schedule of Rates and its periodical review.

II. *Training, Work Study, Research and Development Branch*

(a) Co-ordination of Engineering Research and development and (including research on new materials and equipment),

(b) Case studies and evaluation of works, to evolve economical norms and standards based on functional considerations.

(c) Organising refresher and other courses, seminars etc.

(d) Cost reduction and co-ordination of work studies carried out by other Chief Engineers.

III. *Personnel and Administration Branch*

(a) Future staffing.

(b) Service conditions of engineering employees.

The Board will be essentially a consultative and co-ordinating body and will perform State-wide activities that at present cannot be done efficiently by the departments acting on their own. It will provide a machinery for the Chief Engineers to pool their knowledge and departmental resources in the best interests of the State.

7.14. We strongly feel that the setting up of a Board of Engineers in each State will materially help to achieve co-ordination and efficiency; ensure maximum utilisation of existing resources and promote speed and economy in construction

7.15. Organisational pattern of the P.W.D.—In the earlier part of this chapter we have discussed the changes that are necessary in the organisational structure at the top level of the Public Works

Department. In the following sections, we propose to deal with the general staffing pattern and other relevant factors, which are of no lesser importance in securing efficiency in the working of the department as a whole.

7.16. Designs and Architects wing.—In the past, most of the design work was done in the office of the Executive Engineer who was responsible for the execution of works. As the work increased both in magnitude and variety, the necessity for a specialist organisation for preparing architectural and structural design was felt. The various engineering departments began setting up organisations for this to suit their requirements. The growth of such design organisations has naturally been on different lines in the various departments. In Maharashtra, Mysore, West Bengal and Gujarat planning circles have been created under the charge of a Superintending Engineer. In Madras, there is a technical branch under an officer of the rank of Executive Engineer for the preparation of designs and estimates. These wings, however, do not deal with contractual side of the work. In C.P.W.D., a Superintending Surveyor of Works is attached to each Additional Chief Engineer who not only prepares designs and estimates but also attends to contractual matters with regard to cases which come up to the Additional Chief Engineer. In M.E.S., in addition to a design wing, there is a separate cadre of Surveyor of Works who specialise in the preparation of contract documents and bills of quantities. They also attend to all matters relating to contracts that arise during the execution of works. The architects wing in almost all cases is separate from the designs wing though in the M.E.S. both are under the Director of Designs.

In the context of the vast developmental activity that the country has undertaken, planning and designing assume great importance. They become the job of specialists. It is not possible to delegate this responsibility to the field staff who are already over-burdened with executive responsibilities. Further, it has been increasingly recognised that considerable reduction in cost can be effected only at the planning stage. We, therefore, strongly recommend the creation of a Central Design and Architects Branch in all Public Works Departments. The architectural side should be under the charge of a Senior Architect of the rank of Superintending Engineer or even a Chief Architect. For the design wing, the officer incharge should at least be of the rank of Superintending Engineer. Depending upon the importance and the magnitude of work, the officer incharge of the design wing could even be of the rank of Chief Engineer. He should work in close collaboration with the Chief Architect and should be responsible to the Senior Chief Engineer of the Department for the preparation of architectural & structural plans and estimates of cost of projects which are to be sanctioned by the Chief Engineer and for the development of standard plans and estimates where required. The priorities for the preparation of plans and designs will be determined by the departmental Committee of Chief Engineers if there are more than one Chief Engineer in the department.

At the circle level, we recommend the creation of a design cell under the charge of an officer of the rank of Executive Engineer for the preparation of designs and estimates of works which are within the competence of the Superintending Engineer to sanction. This is necessary as we have recommended increased delegation of powers to the Superintending Engineer and his office should be strengthened to enable him to discharge the increased responsibilities. At the Executive Engineers' level also, we recommend the setting up of a small design cell under the charge of an Assistant Engineer or an Assistant Executive Engineer. This will help the Executive Engineer to discharge the increased responsibility that will devolve on him consequent on the suggested increase in his powers of technical sanction etc.

7.17. Surveyor of Works cadre.—This cadre is prevalent only in the M.E.S. We have studied the working of the Surveyor of Works Organisation and consider that this is a definite help in the correct and expeditious preparation of contracts and bills of quantities. It will be a definite advantage if a similar cadre is organised in all the engineering departments. This, however, will take time as officers have to be trained. To start with, therefore, the design wing at the Chief Engineer's level and the design cells with the Superintending Engineer and Executive Engineer should in addition to the design work be responsible for the preparation of contract documents. The department should take steps in the meanwhile to create a cadre of Surveyor of Works which should ultimately be in line with the one in vogue in M.E.S.

7.18. Personnel Administration.—With the increase in the volume and variety of work, consequent increase in the staff and the changes in service rules of different categories of staff, the work of personnel administration in Public Works Department has considerably increased. It is necessary to give adequate administrative powers to the Chief Engineer and strengthen his office to enable him to meet the situation.

Our studies show that the powers of the Chief Engineer to make transfers and postings of his officers vary widely. In one State P.W.D. even for the transfers and postings of Assistant Engineer, the Chief Engineer has to obtain orders from Government. Elsewhere, the Chief Engineer has powers to transfer and post officers up to the rank of Executive Engineer. We consider that for operational efficiency it is extremely necessary that all Chief Engineers should have powers to order postings and transfers of officers upto the rank of Executive Engineer.

7.19. Role of work study in public works administration.—The phenomenal increase in developmental activity has given rise to several special problems in administration. Comparatively junior officers have to occupy senior positions. In a growing economy, this situation is inescapable. Purposeful administration must devise ways and means of overcoming the deficiency in the experience of officers by instituting special courses calculated to improve their managerial skill in a short time.

Training in the technique of work study comes in handy for this purpose. It has been the experience of several technically advanced countries that the training in work study helps project officers in attaining maturity quickly. Established industrial organisations like the Imperial Chemical Industries are depending to a great extent on work study to develop the managerial talent required for manning their new schemes and projects.

In India too, the importance of work study is being increasingly recognised. Our case studies of public works administration and the work of the Committee on Plan Projects in other fields bear ample evidence to the effective role that work study can play in improving economy and efficiency all round and especially in the scheme of cost reduction which has assumed great importance today. The brochure entitled 'Scheme of Cost Reduction' published by the Committee on Plan Projects clearly outlines the scope of work study in optimisation of results with available resources. It will be relevant to mention in this connection that the Prime Minister in a statement placed on the Table of Lok Sabha on the 10th August 1961 on measures for strengthening administration has made a pointed reference to work study and has suggested that it would be introduced as a compulsory subject in the initial training curricula of all established services and refresher courses on work study would be extended for all inservice personnel.

We strongly recommend that engineering organisations in the country should become more alive to this technique and set up work study wings for the continuous evaluation of their work and work procedures. The departments should also make work study a part of the training curricula for their staff. For the work study unit to be effective, we would recommend that it should be under the charge of an officer not lower than a Superintending Engineer. The unit need not be very big. It may, to start with, consist of a Superintending Engineer, two or three Executive Engineers with a few selected Assistant Engineers who have a flair for imaginative thinking and critical analysis. The officers could be initially trained in work study by deputing them to attend courses organised by the Organisation and Methods Division of the Government of India or to the recently established Work Study Institute of the Defence Ministry. Later on, the Work Study Unit itself may institute training programmes for the departmental personnel. The 'expertise' on critical analysis gained by the Unit should be increasingly made use of on bigger projects taken up by the department.

7.20. Powers of Officers.—We had occasion to mention earlier that the powers vested with engineer officers vary widely from State to State and in many cases they are inadequate to cope with the increased tempo of work. Steps have been taken to enhance the powers of Public Works officers but these have been sporadic. Our study shows that there is still a wide difference in the powers of engineering officers in different State and Central Departments. There is thus a need for not only enhancing the powers but also for placing them on a uniform footing. We have made a detailed study of the existing powers of engineer officers in various departments and have made suggestions for radical revision which are contained in the suggested Schedule of Powers given in Appendix XIII. Some of the salient features of the revision are mentioned below :

I. *Technical Sanction.*—The Superintending Engineer should have the powers to sanction the estimates technically upto Rs. five lakhs and the executive Engineer upto one lakh of rupees.

II. *Acceptance of tenders.*—The Superintending Engineer should have the powers to accept tenders upto Rs. ten lakhs when the tender excess is below 5% of the sanctioned estimate.

III. *Sanction of extra/substituted items.*—The Superintending Engineer should have full powers to sanction extra and substituted items for his own contracts. In cases of agreements accepted by higher authorities he may sanction, extras upto 5% of the contract amount or Rs. 50,000 whichever is less. The Executive Engineer may have full powers to sanction extras for his own contracts. In case of agreements accepted by higher authorities, the heads of the Departments may delegate such powers to the Executive Engineers as may be necessary.

IV. *Extension of time.*—The Superintending Engineer should have full powers to grant extension of time.

V. *Stores.*—Powers for the purchases of stores have been dealt with in Chapter 5.

VI. *Other Powers.*—Distinct improvements have been suggested with a view to facilitating day-to-day work.

7.21. Norms for work load and staffing.—Our studies have shown that considerable time is lost in obtaining sanction for additional divisions or sub-divisions to cope with the work. This hampers the progress of work in the initial stages and when posts are ultimately sanctioned, the tendency is to rush through with the work which is not conducive to efficiency.

It is, therefore, essential that the Chief Engineer should be empowered to create divisions or sub-divisions as and when works warrant and take steps to fill them up by suitable hands. One of the pre-requisites for this is the fixation of work loads and staffing norms. The fixation of work loads is even otherwise necessary to secure equitable distribution of load on the various divisions. At present. we find that there is a wide variation in the work loads of various divisions. Some of the divisions have work load of Rs. 80 to 90 lakhs per annum. Such heavy work load leads to ineffective supervision and consequent lowering of standards of work. Where work loads are low, utilisation of staff is naturally poor and this again is not conducive to economy. The need for a certain uniformity in work loads is obvious.

Normally work loads are fixed on value basis. We realise that this is not rational as there are other considerations like nature and type of work, extent of work, location etc., which have an important bearing on work load calculations. As there does not appear to be any other satisfactory way of indicating a standard, we feel that the work load should be prescribed on value basis taking into account, however, the nature and type of construction. As the division is the basic unit in the Public Works Department, we would prescribe the following loads for it:—

Original Works (Buildings and Roads) Concentrated. . . .	Rs. 40 to 50 lakhs
Original Works (Buildings and Roads) Scattered. . . .	Rs. 25 to 40 lakhs
Minor and Maintenance Works (Buildings and Roads) Concentrated	Rs. 16 to 20 lakhs
Minor and Maintenance Works (Buildings and Roads) Scattered	Rs. 10 to 16 lakhs
Original Works (Electrical)	Rs. 20 to 30 lakhs
Maintenance Works (Electrical)	Rs. 7 to 10 lakhs

Normally a division may have 4 to 5 sub-divisions, each sub-division having 4 to 5 sections. The figures of work load are subject to the proviso that officers upto A.E.'s level should be provided vehicles for inspection purposes. In the case of construction works, the work load in the first year will be reduced by 50% and full work load will apply in subsequent years.

A circle will consist normally of 4 divisions and in exceptional cases of 5 divisions and the Chief Engineer should not have more than 5 circles.

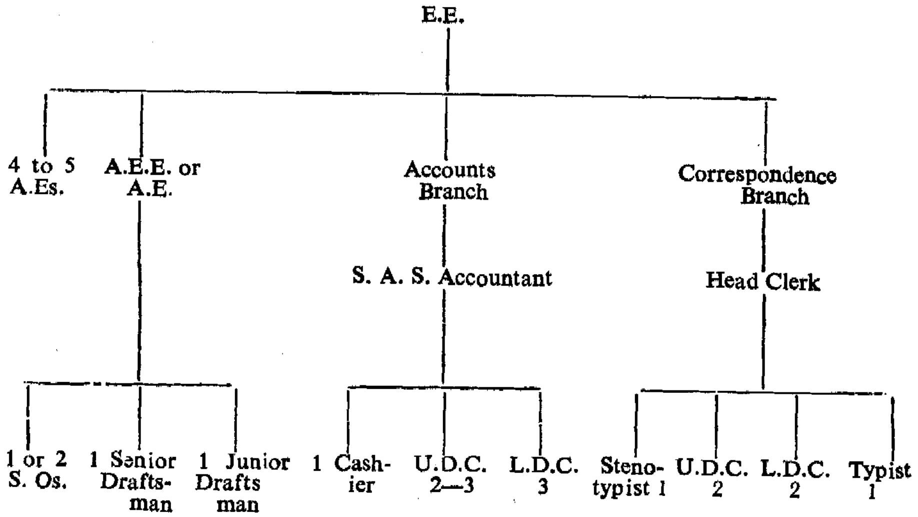
With the norms for work load so decided the Chief Engineer should have the power to sanction these divisions and sub-divisions as and when warranted by additional work and start the work in time. This is in keeping with the recent delegation of financial powers given to Central Ministries. We recommend that similar delegation of powers should be made by the State Governments as well.

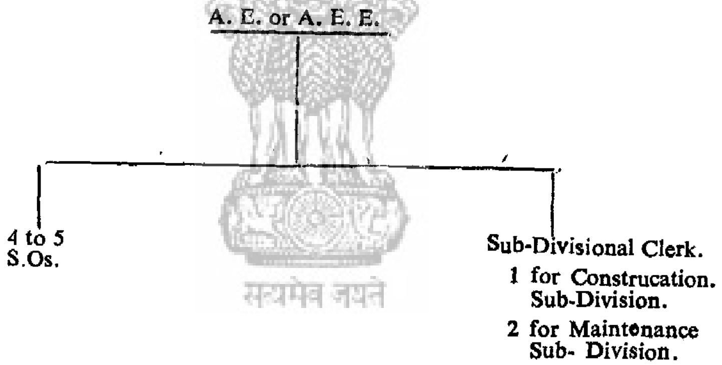
Sanctioning of divisions and sub-divisions is tied up with the staffing pattern and strength. Having made a comparative analysis of the staff pattern of divisions and sub-divisions in the various Public Works Departments, we recommend that the normal staff pattern may be as indicated on page 59. The strength of different categories of staff is also indicated.

7.22. Conclusion.—With the phenomenal expansion of the range and scope of the activities of Government, the tasks of administration have grown both in volume and complexity.

It has accordingly become necessary to carefully examine, review and evaluate the traditional system of administrative checks, final control and procedures. The objective of the executive agency in the context of the developmental economy of the country has to be two fold; the available resources of technical knowledge, manpower and material are to be deployed to cover as large an area of work as possible, the allotted jobs have to be performed and completed with efficiency and speed, *i.e.*, with economy of both time and money. This objective can be realised only if tasks are allotted specifically in no uncertain terms, to individuals and organisations and responsibility for achieving results is placed squarely on their shoulders. But those who are invested with responsibility should have the powers and authority to initiate, improvise and innovate within fairly broad limits. We have attempted in this report to formulate concrete proposals for introducing certain basic modifications in the existing pattern of administrative organisation, methods and procedures affecting the planning and execution of public works. In our view these changes are necessary if the agency for planning and executing constructional tasks is to be 'action' oriented and geared to achieve optimum results with dispatch and efficiency.

Suggested Staff Pattern of a Division and a Sub-Division




A. E. or A. E. E.
4 to 5 S.Os.
Sub-Divisional Clerk.
1 for Construcation. Sub-Division.
2 for Maintenance Sub- Division.

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SUMMARY OF IMPORTANT RECOMMENDATIONS

1. Adequate time should be allowed to engineering departments to plan the works properly with a view to obtaining the most economical results. (Para 1.2.).

2. The outline of a Five Year Plan should be finalised at least one year before the commencement of the Plan period to make planning effective. (Para 1.3.).

3. Budget provision should be made only for those works which have been administratively approved and demands for funds should only be made after consultation with the Chief Engineer. (Para 1.4.).

4. With a view to an even distribution of construction activity throughout the year, we would suggest that the budget year commences from 1st of July. (Para 1.5).

5. Budgeting for materials is as important as budgeting for works. We recommend the setting up of material budgeting cells in the State and Central Engineering Organisations. The work of these cells should be co-ordinated by a Central Cell in the Planning Commission which should be in a position to correlate overall requirements and availability of construction materials and equipment. (Para 1.6.).

6. In the case of proposals involving acquisition of land or materials with long lead times, the budget allotment itself should be given in two parts, the first part to cover the cost of such materials/and/or land and the other given subsequently, as for works in progress, to cover the actual cost of execution. (Para 1.7.).

7. Requirements of projects should be studied by a composite Panel in which all the technological disciplines connected with the particular undertaking including work study are represented. (Para 1.8.).

8. When once requirements have been arrived at in a logical way, the users should normally refrain from making changes at a later stage. (Para. 1.9.).

9. Check-lists for different types of project should be prepared indicating the norms and standards. The engineering departments may use check-lists prepared by the Committee on Plan Projects for multi-storeyed buildings, residential buildings, industrial estates, hostels etc. In other cases, they can prepare check-lists in consultation with the authorities concerned. If schemes are accompanied by check-lists indicating the figures sought to be realised in comparison with the norms laid down, it would facilitate checking and avoid to a great extent queries and resultant delays. (Para 1.12.).

10. More public construction undertakings, such as the National Projects Construction Corporation and National Buildings Construction Corporation, should be set up. (Para 2.4.).

11. Social organisations, such as the Bharat Sewak Samaj should be given greater encouragement. They may be given exemptions from payment of earnest money and security deposit. Public Works Departments may also hire out initially their tools and equipments to the Samaj. (Para 2.5.).

12. The earnest money to be paid at the time of tendering should be reduced to 1% of the cost of works subject to a maximum of Rs. 20,000. (Para 2.7.).

13. The security deposit should be released in three stages; 50% on completion of work, 25% on payment of final bill and 25% on the completion of defects liability period. This will considerably avoid complaints regarding undue locking-up of contractors' money. (Para 2.7.).

14. We have taken up the preparation of standard Schedules of Rates by various zones in the country. It is recommended that a permanent cell be formed in each zone for the purpose of keeping this schedule up-to-date. For the purpose of co-ordination, a cell should be set up in the Planning Commission. (Para 2.8.).

15. The adoption of lump sum contract would lead to speedier completion of works and reduction in contractual problems. (Para 2.9.).

16. Some existing conditions of contract are oppressive on one side. Suitable recommendations have been made to modify these conditions with a view to making them equitable. (Para 2.12.).

17. The necessity of prompt payment to contractors does not require special emphasis. The undisputed portion of the bill should be paid within four months of the completion of the work. (Para 2.13.)

18. Scrutiny of contractor's claims by departments prior to submitting them for arbitration should be discontinued. (Para 2.16.).

The present system of appointing a sole arbitrator by Government is satisfactory. (Para 2.17.).

Once an award has been given, it should be implemented quickly. For this purpose, a lump sum should be placed at the disposal of the Chief Engineer at the beginning of the financial year. (Para 2.18.).

19. Engineering authorities should be empowered to accept, where necessary tenders which are not the lowest subject to an intimation to the next higher engineering authority. (Para 3.3.).

20. If the plan projects are to have an impact on the public, it is essential to see that the flow of benefits is commensurate with the expenditure incurred. This can be achieved by adopting the "Line of Balance Technique" outlined by the Committee on Plan Projects for programming and progressing of works. (Para 3.5.).

21. The present system of technical examination of works by an outside agency has done more harm than good. While it has disclosed some overpayments and lapses in the line of management, it has also had the effect of killing initiative among officers obliging them to play safe and of acting as a strong deterrent to the development of leadership. The Technical Examiners' Organisation as such should be abolished and replaced by measures for strengthening of public works organisations from within such as rationalisation of work loads, preparation of realistic schedules and specifications, increase in powers and institution of work study wings. (Para 4.12).

22. Existing procedure for stores accounting is cumbersome. A completely revised scheme has been given which would make stores management simpler and more purposeful. (Para 5.9.).

23. It is advisable to separate the accounting and audit functions and keep the former (accounting and primary audit) with the Chief Engineer. (Para 6.3.).

24. An S.A.S. Accountant should replace the existing Divisional Accountant in each Public Works Division. (Para 6.5.).

25. The procedure for public works accounting is involved. There is a great scope for simplification. Detailed recommendations including the following have been made for streamlining the procedure with reference to payment of bills to suppliers, inter-departmental transactions, accounting for materials etc. (Para 6.9. to Para 6.15.).

(1) Payment of bills of supplies could be made direct to the suppliers or to the Accounts Officer of the Supply Department. (Para 6.10.).

(2) Payments for railway freight could be made through cheques instead of credit notes. (Para 6.11.).

(3) Inter-departmental adjustments should also be settled by cheques. (Para 6.12.).

(4) Preparation of Capital and Revenue Accounts should be dispensed with. (Para 6.16.).

26. There should be for each State one unified Service of Engineers for all branches of engineering in that State. (Para 7.1.).

27. The posts of the Secretaries of the engineering departments should be held by the highest technical personnel i.e., Chief Engineers of the State. This would lead to both economy of time and manpower and efficiency in execution of projects. (Para 7.9.).

28. The offices of the Secretary and the Chief Engineer should be combined thereby avoiding duplication of personnel and work which obtains at present in several States and Central Departments. (Para 7.9.).

29. A high-power board of technical experts, namely, the Board of Engineers should be set up in each State charged with specific responsibility for co-ordinating engineering activities and tendering expert advice from day-to-day on important matters affecting the development of the State. (Para 7.12.).

30. In the context of the vast developmental activity that the country has undertaken, planning assumes great importance. A Central Design and Architectural Branch should be set up in all Public Works Departments. (Para 7.16.).

31. Engineering organisations in the country should become more alive to work study and the role it can play in improving efficiency and economy all round and especially in the scheme of cost reduction which has assumed importance today. A Work Study Wing should be set up in each department for evaluation of works and works procedures with a view to economy and efficiency. (Para 7.19.).

32. Powers of engineering officers vary widely and are inadequate to meet the increasing tempo of works. Suggestions for radically altering the powers have been made. Notable among them are mentioned below:

(a) Superintending Engineer should have powers of technical sanction up to Rs. 5 lakhs and the Executive Engineer upto Rs. one lakh.

(b) The Superintending Engineer should have powers to accept tenders upto Rs. 10 lakhs and Executive Engineer upto Rs. one lakh.

(c) The Superintending Engineer and Executive Engineer should have full powers to sanction extra or substituted items for their own contracts.

(d) The Superintending Engineer should have full powers to grant extension of time. (Para 7.20.).

33. Work loads of divisions on value basis have been prescribed taking into account the difference in the nature and type of work.

Original works (Bldgs. &Roads)	concentrated	Rs. 40 to 50 lakhs
do.	scattered	Rs. 25 to 40 lakhs
Minor and Maintenance works (Bldgs. & Roads)	Concentrated	Rs. 16 to 20 lakhs
do.	scattered	Rs. 10 to 16 lakhs
Original works (Electrical)		Rs. 20 to 30 lakhs
Maintenance works (Electrical).		Rs. 7 to 10 lakhs

Staffing norms also have been prescribed. With the norms so prescribed, the Chief Engineer should be empowered to create extra divisions or sub-divisions as the volume of work warrants and to staff them. (Para 7.21.).

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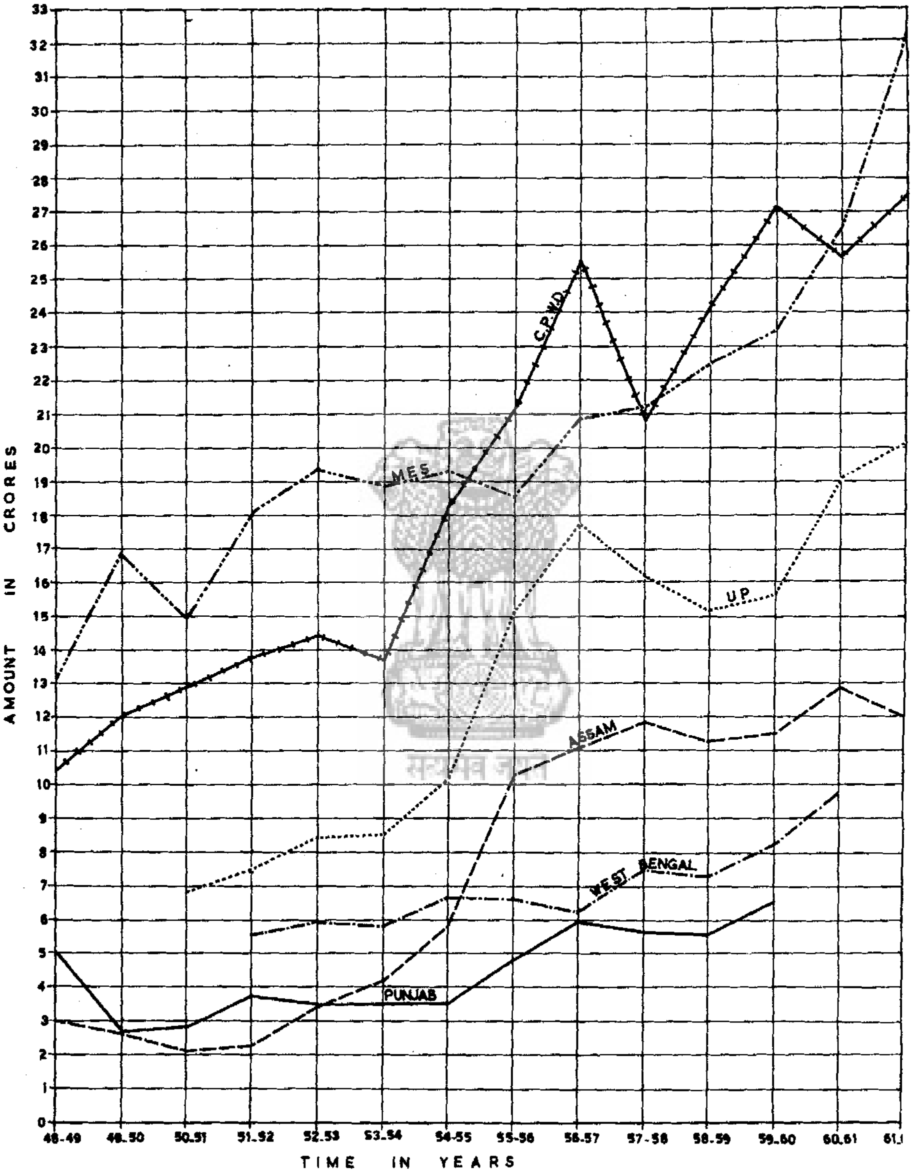
INCREASE IN WORK LOAD IN RECENT YEARS

APPENDIX –



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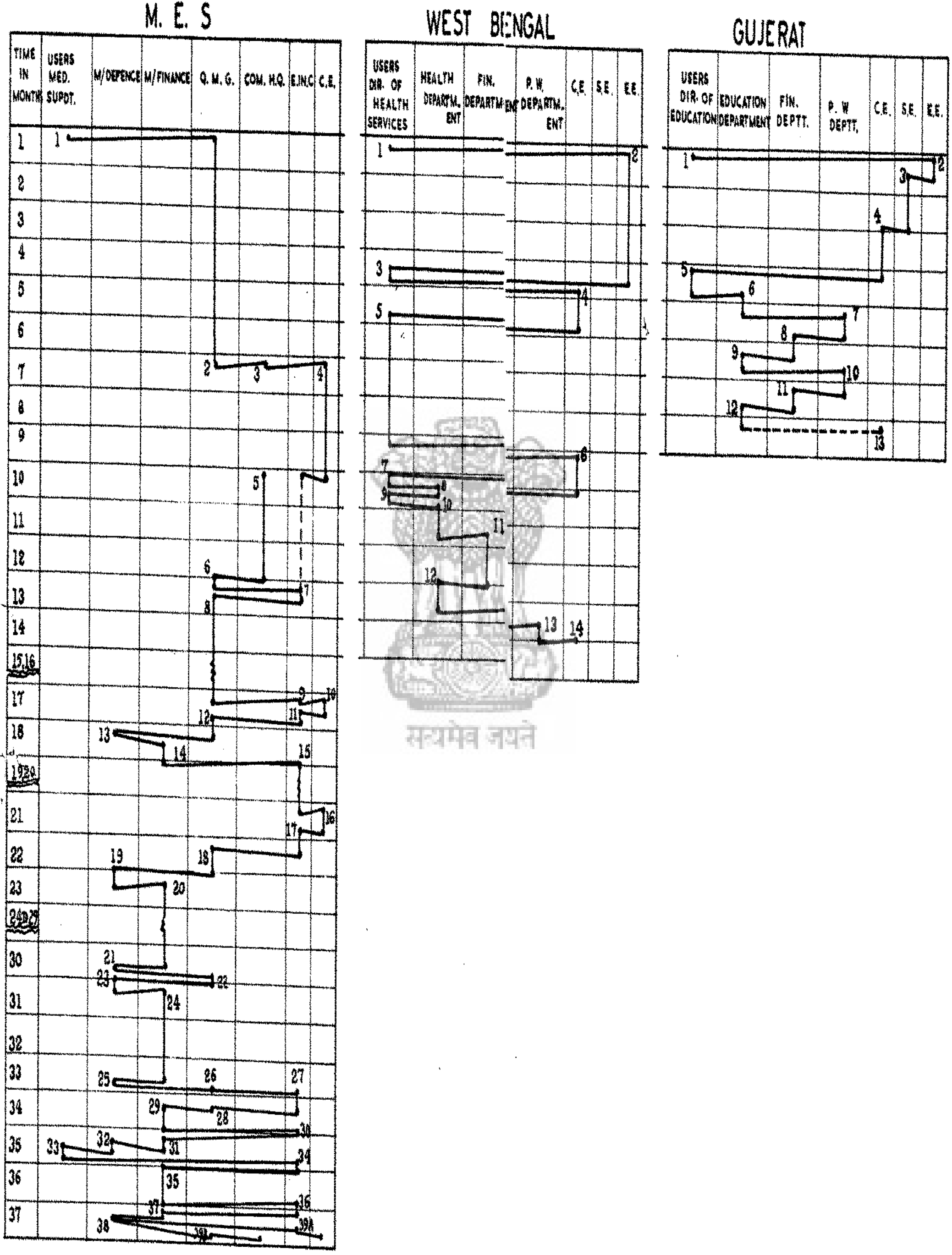
Appendix III

FLOW OF SELECTED CASES UP TO THE STAGE OF ADMINISTRATIVE APPROVAL

(STRING DIAGRAM)



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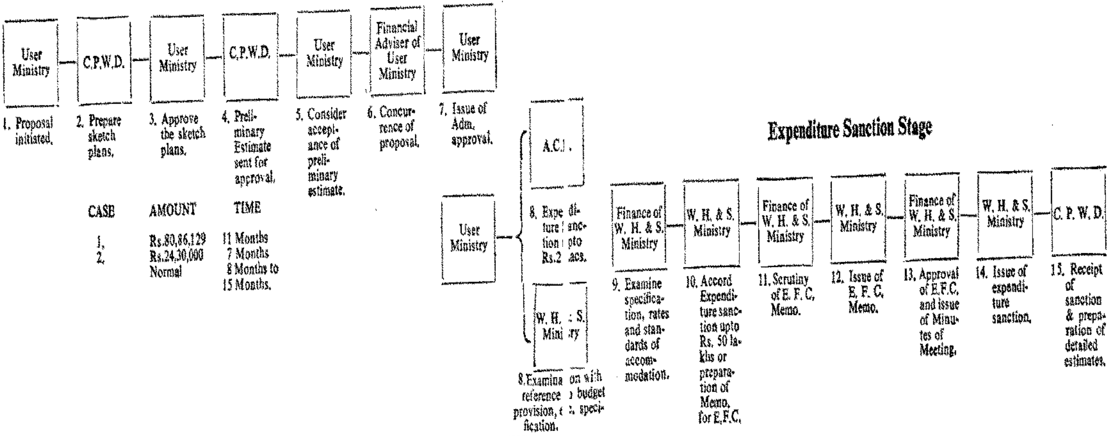
APPENDIX II

Procedure for Administrative Approval

(Flow Diagram)

1. C. P. W. D.

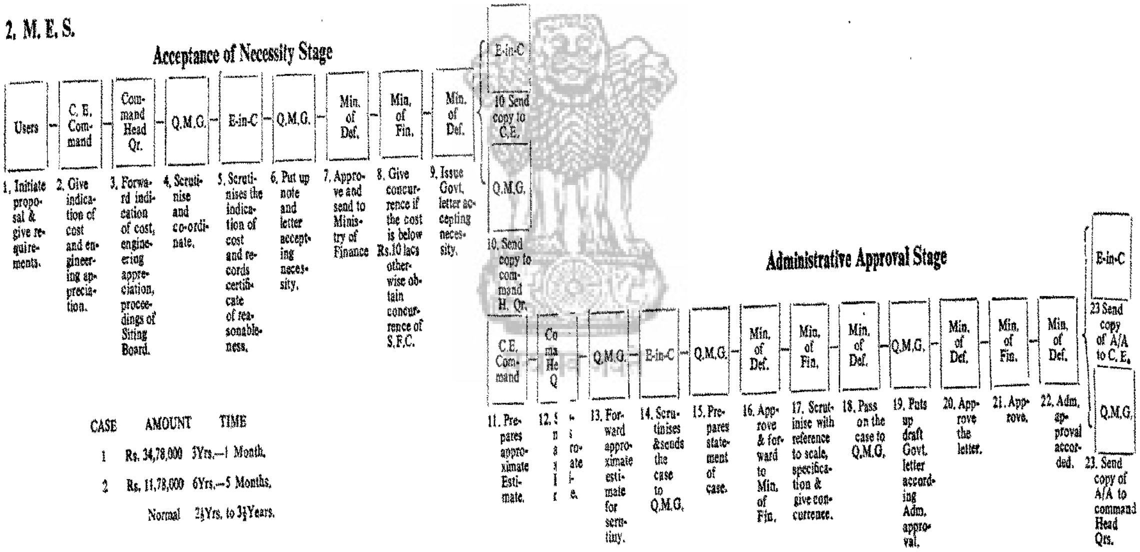
Administrative Approval Stage


User Ministry
C.P.W.D.
User Ministry
C.P.W.D.
User Ministry
Financial Adviser of User Ministry
User Ministry
1. Proposal initiated.
2. Prepare sketch plans.
3. Approve the sketch plans.
4. Preliminary Estimate sent for approval.
5. Consider acceptance of preliminary estimate.
6. Concurrence of proposal.
7. Issue of Adm. approval.
Expenditure Sanction Stage
User Ministry
A.C.I.
8. Expe di-
ture sanc-
tion upto
Rs.2 acs.
W. H. S.
Mini ry
8. Examina on with
reference budget
provision, speci-
fication.
Finance of W. H. & S. Ministry
W. H. & S. Ministry
Finance of W. H. & S. Ministry
W. H. & S. Ministry
Finance of W. H. & S. Ministry
W. H. & S. Ministry
C. P. W. D.
9. Examine specification, rates and standards of accommodation.
10. Accord Expenditure sanction upto Rs. 50 lakhs or preparation of Memo, for E.F.C.
11. Scrutiny of E. F. C. Memo.
12. Issue of E. F. C. Memo.
13. Approval of E.F.C. and issue of Minutes of Meeting.
14. Issue of expenditure sanction.
15. Receipt of sanction & preparation of detailed estimates.

CASE	AMOUNT	TIME
1.	Rs.80,86,129	11 Months
2.	Rs.24,30,000	7 Months
	Normal	8 Months to 15 Months.

2. M. E. S.

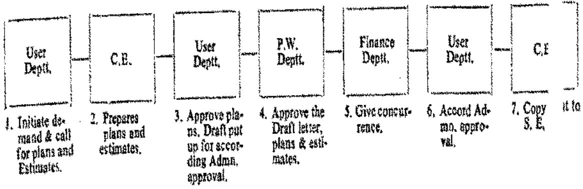
Acceptance of Necessity Stage


Users
C. E. Command
Command Head Qr.
Q.M.G.
E-in-C
Q.M.G.
Min. of Def.
Min. of Fin.
Min. of Def.
1. Initiate proposal & give requirements.
2. Give indication of cost and engineering appreciation.
3. Forward indication of cost, engineering appreciation, proceedings of Siting Board.
4. Scrutinise and co-ordinate.
5. Scrutinises the indication of cost and records certificate of reasonableness.
6. Put up note and letter accepting necessity.
7. Approve and send to Ministry of Finance
8. Give concurrence if the cost is below Rs.10 lacs otherwise obtain concurrence of S.F.C.
9. Issue Govt. letter accepting necessity.
E-in-C
10 Send copy to C.E.
Q.M.G.
10. Send copy to command H. Qr.
Administrative Approval Stage
C.E. Command
Co ma He Q
Q.M.G.
E-in-C
Q.M.G.
Min. of Def.
Min. of Fin.
Min. of Def.
Q.M.G.
Min. of Def.
Min. of Fin.
Min. of Def.
E-in-C
Q.M.G.
11. Prepares approximate Estimate.
12. S
ro-
ate
e.
13. Forward approximate estimate for scrutiny.
14. Scrutinises &sends the case to Q.M.G.
15. Prepares statement of case.
16. Approve & forward to Min. of Fin.
17. Scrutinise with reference to scale, specification & give concurrence.
18. Pass on the case to Q.M.G.
19. Puts up draft Govt. letter according Adm. approval.
20. Approve the letter.
21. Approve.
22. Adm. approval accorded.
23 Send copy of A/A to C. E.
23. Send copy of A/A to command Head Qrs.

CASE	AMOUNT	TIME
1	Rs. 34,78,000	3Yrs.—1 Month.
2	Rs. 11,78,000	6Yrs.—5 Months.
	Normal	2½Yrs. to 3½Years.

3. GUJARAT P. W. D.

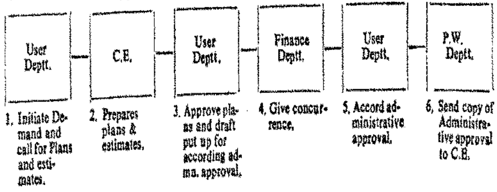
Administrative Approval Stage


User Deptt.
C.E.
User Deptt.
P.W. Deptt.
Finance Deptt.
User Deptt.
C.E
1. Initiate demand & call for plans and Estimates.
2. Prepares plans and estimates.
3. Approve plans. Draft put up for according Admn. approval.
4. Approve the Draft letter, plans & estimates.
5. Give concurrence.
6. Accord Admn. approval.
7. Copy S. E.
it to

CASE	AMOUNT	TIME
1	Rs.20,08,850	1 Month
2	Rs.17,23,616	7 Months
	Normal	6 Months to 1 Year

WEST BENGAL P. W. D.

4. Administrative Approval Stage


User Deptt.
C.E.
User Deptt.
Finance Deptt.
User Deptt.
P.W. Deptt.
1. Initiate Demand and call for Plans and estimates.
2. Prepares plans & estimates.
3. Approve plans and draft put up for according adm. approval.
4. Give concurrence.
5. Accord administrative approval.
6. Send copy of Administrative approval to C.E.

CASE	AMOUNT	TIME
1	Rs.12,00,400	1 Year—5 Months
2	Rs.2,88,800	1 Year—1 Month.
	Normal	1 Year to 1½ Years.

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APPENDIX I V

Check list & standard Norms for Industrial Estates

Location of Estate.

Agency for planning & designing.

Agency for construction.

S.No.	Particulars	Recommendations of the Committee on Plan Projects	Realised figures in the particular case	Remarks or reasons for deviation, if any
1	2	3	4	5
		Planning and lay out		
1	Survey of industrial potential.	A thorough survey must be conducted.		
2	Choice of Site . .	The site should be capable of easy drainage, should be close to perennial water supply and within a reasonable range from source of power.		
3	Siting of Estate . .	Preferably near towns having a population below 50,000.		
4	Distance from Railway Station.	It should be preferably close to Railway Station with goods yards facilities.		
5	Availability of residential accommodation.	The location of Industrial Estate should not result in further concentration of population. It would be advantageous to combine a housing scheme with an Industrial Estate.		
6	Total area of Estate .	..		
7	Area under factory plots	This should be 60 to 65% of the total area.		
8	Area under roads . .	This should not be more than 20% of the total area of the Estate.		

1	2	3	4	5
9	Area of open space .	This can be upto 10% of the total area of the Estate.		
10	Area under administrative and other buildings.	This can vary between 5 to 10% of the total area of the Estate.		
11	Number and types of worksheds.	It is not necessary to adopt a large number of different sizes.		
12	The minimum size of worksheds.	600 sft.		
13	Maximum size of worksheds.	6,000 sft.		
14	Covered area of worksheds.	This should not be less than 50% of the plot area. It is also not necessary to provide for open space in all worksheds.		
		Design details		
15	Plinth height . .	A plinth height of 1 ft. above crown of the road will be sufficient if satisfactory arrangements are made for surface drainage.		
16	Height upto the level of roof from plinth.	14 ft.		
17	Windows and ventilators	The area of these should not be more than 25% of floor area in humid regions and not more than 15% in hot dry regions.		
18	Number of doors . .	Normally two doors are sufficient.		
19	Size of doors . .	Main door 8′ × 8′ and rear door 8′ × 6′.		
20	Flooring . . .	This must be decided upon only after the allotment.		
21	Roofing . . .	This must be decided after considering all the alternatives suggested in the Report.		
22	Water supply & drainage.	This must be provided for at the initial stage of planning.		

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APPENDIX V

Statement of important works undertaken by the Bharat Sewak Samaj during 1956-62

(All figures are in Rs. lakhs.)

S.No.	Name of the work	Cost of work at the market rates or the rates tendered by the contractors	Cost at which taken by the B.S.S.	Direct savings to the exchequer	Cost at which the work is executed	Savings to B.S.S.	Remarks
1	2	3	4	5	6	7	8
	Works at Delhi						
Earth Work							
1.	E-work in Jamuna bund.	11·85	6·85	5·00	5·27	1·58	
2.	Repairs to left marginal bund, Okhla.	1·47	1·47	..	1·36	0·11	
3.	Najafgarh Nulla Phase I.	1·75	1·75	..	1·00	0·75	
4.	Raising & Strengthening of Shahdara Bund.	2·50	2·50	..	2·31	0·19	
5.	E-work at Gandhi Samadhi.	4·10	4·08	0·02	3·38	0·70	
6.	E-work on raising right marginal bund.	0·50	0·40	0·10	0·30	0·10	
7.	E-work on Ghalib bund.	1·05	0·80	0·25	0·60	0·20	
8.	Najafgarh Nulla Phase II.	2·50	1·80	0·70	1·60	0·20	
Exhibition works							
9.	Works in Industrial Exhibition 1958.	4·89	4·89	..	3·76	1·13	
10.	Works in Industrial Exhibition 1961.	7·70	6·00	1·70	4·25	1·75	

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1	2	3	4	5	6	7	8
C-Power House							
11.	Phase I . .	3·40	3·36	0·04	2·46	0·90	
12.	Phase II . .	5·00	4·90	0·10	3·90	1·00	
Supply of materials							
13.	Brick kiln . .	4·75	3·75	1·00	3·45	0·30	
14.	Sand . . .	6·50	3·75	2·75	3·35	0·40	
15.	Development of colonies near Kalka.	12·00	11·50	0·50	10·50*	1·00	*Estimated.
16.	Multi-storeyed buildings and workshops, etc.	33·00	30·00	3·00	*	*	*Work in progress.
17.	Stone pitching of left marginal bund.	5·00	2·80	2·20	2·51	0·29	
	Works at Bombay						
18.	Development of colony sites in Sion.	39·00	31·00	8·00	28·00	3·00	
	Works in Bihar						
19.	Earth work and building work in Kosi area and railway embankment.	320·00	200·00	120·00	184·00	16·00	
	Works in Andhra						
20.	Earth work excavation in the left main canal Nagarjunasagar Project.	40·00	40·00	..	39·00	1·00	

APPENDIX VI

Rules regarding the Enlistment of all categories of Contractors.

The enlistment of contractors in the C.P.W.D., M.E.S., and Railways will be done in the following categories:—

1. Buildings and Roads.
2. Sanitary and Water Supply.
3. Furniture.
4. Electrical.

NOTE.—Further categories may be added by the Department concerned as necessary.

1. Buildings and Roads

This category of contractors will consist of the following classes :—

Class A . . .	Qualified to tender for works upto any limit.
Class B . . .	Qualified to tender for works not exceeding Rs. 15 lakhs
Class C . . .	Qualified to tender for works not exceeding Rs. 5 lakhs
Class D . . .	Qualified to tender for works not exceeding Rs. 2 lakhs.
Class E . . .	Qualified to tender for works not exceeding Rs. 50,000.
Class F . . .	Qualified to tender for works not exceeding Rs. 10,000.

Qualifications for enlistment

Class A—Unlimited.—Enlistment to this category should be confined to:—

(a) Private or Public Limited Companies.

(b) They must have Engineering Organisation capable of dealing with large works and should have at least one qualified experienced Engineer permanently on their staff having an experience of not less than ten years.

(c) They should have executed at least 5 works costing more than Rs. 10 lakhs individually statisfactorily.

(d) They should have also sufficient machinery and tools etc. at their disposal.

Class B—Tendering limit upto Rs. 15 lakhs.-Contractors desiring enlistment in this class should have executed statisfactorily at least 5 works costing more than Rs. 2 lakhs individually.

Class C—Tendering limit upto Rs. 5 lakhs.—Contractors desiring enlistment in this class should have executed satisfactorily at least 5 works costing more than Rs. 1 lakh individually.

Class D—Tendering limit upto Rs. 2 lakhs.—Contractors desiring enlistment in this class should have executed satisfactorily at least 5 works costing more than Rs. 25,000 individually. This condition may be waived off if the contractor is a qualified Engineer himself.

Class E—Tendering limit upto Rs. 50,000.—Contractors desiring enlistment in this class should have executed satisfactorily at least 5 works individually costing more than Rs. 5,000. This condition may be waived off if the contractor is a qualified overseer himself.

Class F—Tendering limit upto Rs. 10,000.—As this class of contractors will include petty suppliers as well as those who may carry out petty repair works, it is not necessary to specify any qualifications for enlistment in this class of contractors.

Technical Staff at site of work

The contractor will be required to keep at the site of work the following technical staff when works costing Rs. 2 lakhs and above are under execution :—

When a work costing more than Rs. 5 lakhs is under execution.	One qualified Engineer with at least five years experience with suitable complementary staff according to requirements of works.
When a work costing between Rs. 2 lakhs and 5 lakhs is under execution.	One qualified overseer with at least 5 years experience.

2. Sanitary and Water Supply, Electrical and Furniture

Enlistment of contractors in Sanitary and Water supply, Electrical and Furniture will be done in the following classes.

Class I . . .	Qualified to tender for works upto any amount.
Class II . . .	Qualified to tender for works upto Rs. 50,000.
Class III . . .	Qualified to tender for works upto Rs. 10,000.

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Qualifications for enlistment

Sanitary and Water Supply

Class I—Tendering limit—Unlimited.—Contractors desiring enlistment in this class should have executed satisfactorily at least 5 works costing more than Rs. 25,000 individually.

Class II—Tendering limit upto Rs. 50,000.—Contractors desiring enlistment in this class should have executed satisfactorily at least 5 works, individually costing more than Rs. 5,000.

Class III—Tendering limit upto Rs. 10,000.—Contractors having some experience as Sanitary and Water Supply contractors may be enlisted in this class.

For all classes in S & W category, contractors must be licensed plumbers themselves or at least should employ one in their establishment. In addition, they must employ the following technical staff while executing works:—

(i) When a work costing Rs. 25,000 and upto Rs. 2 lakhs is under execution.	One qualified overseer with an experience of not less than 5 years out of which at least one year should be in Sanitary Engineering or Water Supply Works.
(ii) When a work costing above Rs. 2 lakhs is under execution.	One qualified Engineer with an experience of not less than 5 years, out of which at least one year should be in Sanitary Engineering or Water Supply works.

Furniture

Class I—Unlimited.—Contractors desiring enlistment in this class should possess properly fitted wood workshop with sufficient large stocks of timber. They should have paint, polish and other furnishing equipments and they should employ designers who are capable of producing well thoughtout schemes for furnishing large buildings.

They must have also executed satisfactorily at least 5 works costing Rs. 25,000 or more individually.

Class II—Tendering limit upto Rs. 50,000.—Contractors desiring enlistment in this class should own good workshop having arrangements for producing good quality furniture and should have executed satisfactorily at least 5 works costing Rs. 5,000 or more individually.

Class III—Tendering limit upto Rs. 10,000.—This class of contractors will consist of petty suppliers engaged in trade of furniture supply and those having some experience in furniture making may be enlisted in this class.

Electrical

Class I—Unlimited.—Contractors desiring enlistment in this class should have executed satisfactorily at least 5 works costing more than Rs. 25,000 individually.

Class II—Tendering limit upto Rs. 50,000.—Contractors desiring enlistment in this class should have executed satisfactorily at least 5 works costing more than Rs. 5,000 individually.

Class III—Tendering limit upto Rs. 10,000.—No special qualifications are required for enlistment in this class and those persons engaged in Electrical trade may be enlisted in this class.

Contractors of all classes in Electrical must have electrical licences. In addition they must employ the following technical staff while carrying out works:—

(i) When any work costing between Rs. 25,000 & Rs. 2 lakhs is under execution.	One qualified Electrical Overseer with an experience of 5 years or above.
(ii) When any work costing more than Rs. 2 lakhs is under execution.	One qualified Electrical Engineer with an experience of 3 years or above.

Contractors who are near relatives of Engineering Officers between the grade of S.E. and Asstt. Engineers of the C.P.W.D. (both inclusive) or of similar grades in the Railways and M.E.S. will not be allowed to tender for works in the Circle (responsible for award and execution of contracts) where their near relative is working.

By the term near relative is meant wife, husband, parents, children, brothers, sisters, brother/sister-in-law, son/daughter-in-law, uncle, first cousin and father-in-law.

The present method of enlistment by Zones or otherwise according to convenience of each Department will continue.

A periodical review will be made of all the contractors on the approved list and the names of those who have not secured good reports or have failed to secure a contract after twelve successive tenders or during the period of three consecutive years, whichever is earlier, may be removed from the approved list, or they may be demoted to a lower category or may be asked to switch over their activities from the type of work on which they are generally employed to a different and an easier type of work.

APPENDIX VI

Application for Enlistment of Contractors

1. (a) Name of applicant and full address.
   (b) Place of business (Head Office & Branches if any).
   (c) Telephone No. Telegraphic address.

2. Whether the firm is a private or Public Limited Concern, or undivided Hindu Family or individual registered partnership firm. (Attested copies of Deeds or articles of Association to be enclosed).

3. Whether enrolled as a member of any Builders' Association? If so, give name of the Association and the date of enrolment.

4. Name of person holding the Power of Attorney (Attested copy of power of attorney to be enclosed).

5. Names of partners with their respective shares in the firm (attested copy of the partnership deed to be enclosed).

6. (a) Name of Bankers & full address.
   (b) In case of Limited Liability Companies, copy of last balance sheet duly audited should be attached.
   (c) Particulars of immovable properties with their present market value (attached certificates from Deputy Commissioner/Collector or a First Class Magistrate).

7. Class and category in which enlistment is sought.

8. Area in which the contractor wants to work.

9. Whether the contractor desires to deposit lump sum security for securing exemption from payment of earnest money or will deposit earnest money along with each tender ?

10. List of works executed.—
   (a) Name of work.
   (b) Amount of works executed.
   (c) Year of execution.
   (d) Authority under which carried out.

   To be shown in separate statement.

   Note.—Original or attested copies of certificates, if any, may be enclosed.

11. *Resources of contractors.*
   (a) Details of technical staff permanently employed with technical qualifications & experience of each employee.
   (b) Details of Tools & Plant and Transport etc.
   (c) Details of workshop, if any, with location.

12. Whether the applicant is a licensed plumber or has a licensed plumber under his employment. (Attested copy of plumbing licence to be enclosed).

13. For contractors seeking enlistment as furniture contractors.

    (a) Whether the applicant has a properly fitted wood workshop and if so, give details and location of the workshop.

    (b) Details of stock of timber, paints,polishes and other finishing equipment held by the applicant.

    (c) Number of designers employed capable of producing well thoughtout schemes for large buildings.

14. For contractors seeking enlistment as Electrical contractors.

    (a) Whether the applicant possesses a valid Elect. Licence (Attested copy of licence to be attached).

    (b) Details of technical personnel employed with their qualifications and experience.

15. (a) Whether the applicant is already enlisted in C.P.W.D./M.E.S./Railways, if so, in which class and category.

    (b) Whether enlisted with any other department, if so, in which class & category showing amount upto which qualified to tender.

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16. Whether the applicant is a shareholder or partner of any firm enlisted in this department or any other department.

17. Whether the applicant or any of his partners or shareholders is/are Members of the Indian Parliament or any State Legislature?

18. Has the applicant or any of his partners or shareholders been blacklisted, or removed from the approved list of contractors, or demoted to a lower class, or orders passed banning/suspending business with the applicant etc. by any department in the past?

19. Whether the contractor has read the rules for enlistment of contractors and is prepared to abide by them?

I. I/We certify that I/We will not get myself/ourselves registered as contractor(s) in the C.P.W.D., M.E.S. & Railways under more than one name.

II. A list of those persons who are working with the applicant in any capacity and who are near relatives to any gazetted officer in the C.P.W.D., M.E.S. and Railways or their relative Ministries should be submitted. The applicant should also intimate such persons who are employed by him subsequently.

(The contractors are not entitled to work in a Circle if their near relative is working within the ranks of S.E. & Asstt. Engineer both inclusive or of similar ranks in the M.E.S. & Railways; and any breach of this condition by any contractor would be sufficient to debar him from registration.)

By the term near relative is meant wife, husband, parents, children, brothers, sisters, brother/sister-in-law, son/daughter-in-law, uncle, first cousin and father-in-law.

III. (a) I certify that I did not retire as an Engineer of Gazetted rank or as a Gazetted Officer employed on Engineering or Administrative duties in the Engineering Department to the Govt. of India during the last two years. I also certify that I have neither such a person under my employment nor shall I employ such person within two years of his retirement except with the prior permission of the Government.

I further certify that I am/am not a dismissed Government servant and undertake not to employ directly or indirectly any person dismissed from Govt. service in my business without the prior permission of the registering authority. (*For individuals seeking enlistment in their own name.*)

(b) We certify that none of the partners/Directors retired as an Engineer of Gazetted Rank or as a Gazetted Officer employed in Engineering or Administrative duties in he Engineering Departments of the Govt. of India during the last two years. We also certify that we have neither under our employment any such person nor shall we employ any such person within two years of his retirement except with the prior permission of the Government.

We further certify that $\frac{\text{Partner(s) is/are}}{\text{Director(s) is/are}}$ not dismissed Govt. servants and we undertake not to employ directly or indirectly any person dismissed from Govt. service in our business without the prior permission of the registering authority.

(The inapplicable certificate may be deleted according as an individual or a Limited Company or a Partnership firm is seeking enlistment.)

(For Limited Companies and Partnership firms.)

IV. I/We agree to notify the Officer accepting this application and registering my/our names on the C.P.W.D./M.E.S./Railways list of contractors of any changes in the foregoing particulars as they occur and to verify and confirm these particulars annually on 1st January.

V. I/We note that registration as a contractor does not carry with it the right to tender for works. I/We also understand and agree that the appropriate C.P.W.D./M.E.S./Railways Authority have right as they may decide, not to issue tender form in any particular case and to suspend, remove or blacklist my/our name from the approved list of contractors in the event of submission of non-bonafide tenders or for technical or other delinquency in regard to which decision of the appropriate C.P.W.D./M.E.S./Railways Authority shall be final and conclusive.

VI. I/We certify that the above particulars are correct and that should it be found that I/we have given a false certificate, or that if I/we fail to notify the fact of my/our subsequent amalgamation with another contractor or firm my/our name is liable to be removed from the C.P.W.D./M.E.S./Railways List of contractors and any contract that I/we may be holding at the time is liable to be rescinded.

Delete whichever is inapplicable (*e.g.* in case a contractor wishes to be enlisted with M.E.S. the words C.P.W.D. and Railways should be deleted).

Date : *Signature of the Applicant and Address*

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Important notes

1. All relevant certificates should be attached with the application.

2. Application for enlistment in Buildings & Roads, Sanitary & Water Supply Electrical or Furniture should be submitted on separate forms.

3. Income Tax Clearance Certificate for the latest assessment year should be sent along with the application. Without the Income-Tax Clearance Certificate the enlistment will not be considered.

APPENDIX VII

Rules for Earnest Money and Security Deposit

1. Lump sum/Standing Security (Exemption from payment of earnest money against individual tenders).

Buildings and Roads

Class A— unlimited	Rs. 25,000
Class B—upto Rs. 15 lakhs	Rs. 20,000
Class C—upto Rs. 5 lakhs	Rs. 10,000
Class D—upto Rs. 2 lakhs	Rs. 7,500
Class E—upto Rs. 50,000	Rs. 2,500

Electrical and Mechanical, Furniture, and Sanitary

Class I—unlimited	Rs. 7,500
Class II—upto Rs. 50,000	Rs. 2,500

The payment of lump sum security will be optional.

2. Earnest money

Earnest money shall be recovered at 1% of the estimated amount put to tender subject to a maximum of Rs. 20,000.

3. Security deposit

A security deposit of 10% of the value of work done shall be recovered from the contractors' running account and final bills. In arriving at this 10% recovery, the earnest money deposited by the contractor at the time of submission of the tender shall be taken due consideration of. With this in view, the earnest money initially deposited shall be converted as part of the security deposit to be recovered from the contractor's running account bills.

4. Refund of Security Deposit

50% of the security deposit shall be refunded on issue of completion certificate, 25% on expiry of maintenance period and 25% at the time of the final bill.

APPENDIX VIII

Suggested Form of Notice Inviting Tender

................DEPARTMENT

Notice Inviting Tender

1. Tenders are hereby invited on behalf of the President of India for........

....

....

2.

(a) Lump sum Contracts

The work is estimated to cost Rs.————————————

(Rupees) *(net at par
with Schedule with amendments up to and including
No................................of.......................)

This estimate, however, is not a guarantee and is merely given as a rough guide, and if the work costs more or less, a tenderer will have no claim on that account.

The tender shall be based on :

*(i) Drawings, Specifications, General conditions of contract and Lump Sum tender and Contract for work with Schedule 'A' (List of Works) to be priced by the tenderers from their pricing of Bills of Quantities forming part of contract.

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Note.—The priced Bills of Quantities, when submitted by the tenderers will become the property of Government and in case of successful tenderers the Bills of Quantities will be endorsed and retained by the Accepting Officer. A copy of the prices duly attested by both the parties will be forwarded to contractor.

*(ii) Drawings, Specifications, General Conditions of Contract, with Schedule 'A' (List of Works) pre-priced by the Department and Tenderers required to quote their lump sum arrived at by adding/ deducting a percentage to the total of the department prices.

*(iii) Drawings, Specifications, General conditions of contract and lump sum tender and contract for work with Schedule 'A' (List of Works) to be priced by the tenderers.

*(iv) Lump Sum Tender and Contract for sale of Buildings, Demolition, Removal and Clearance of Site.

*(v) Tender and Contract for Specific jobs.

---

*Strike out if not applicable.

*The work is to be completed within........................ months (in accordance with the phasing, if any, indicated in the tender) from the date of handing over the site and the initial set of drawings, which will be on or about 19

(b) Measurement Contracts other than Term and Running Contracts

*The work is estimated to cost Rs ....
net at par with Schedule of Rates with amendments up to and including..........
No..............of..............)

This estimate, however, is not a guarantee and is merely given as a rough guide, and if the work costs more or less, a tenderer will have no claim on that account.

The Tender shall be based on :

*(i) Drawings, Specifications, General Conditions of Contract and Tender and Contract for work by measurement where tenderers are required to quote a percentage above/below the "Schedule of Rates".

*(ii) Drawings, Specifications, General conditions of Contract and Tender and Item Rate Contract for work by Measurement, with Schedule 'A' (List of Items) to be priced by tenderers.

*(iii) Tender and Contract for Piece Work.

The work is to be completed within.....................months (in accordance with the phasing, if any, indicated in the tender) from the date of handing over the site and the initial set of drawings which will be within approximately 10 days of the acceptance of tender.

(c) Term and Running Contracts

The contract is to run for a period of.....................months, without reference to total cost of work, commencing from............................
19..............................
The Tender shall be based on :

*(i) Drawings, Specifications, General Conditions of Contract and Tender and Term Contract for artificer work, where tenderers are required to quote a percentage, above/below the "Schedule of Rates".

*(ii) Tender and contract for Conveyance of Materials, where tenderers are required to quote their own rates.

*(iii) Tender and contract for Handling Engineer Stores where the tenderers are required to quote a percentage above/below the rates given in schedule 'A' (Description of work to be executed).

*(iv) Drawings, Specifications, General Conditions of Contract for supply of Stores and materials, and Tender Rate Contract for supply of stores and materials with Schedule 'A' (Schedule of Requirements) to be priced by the tenderers.

The works are to be completed within the time stated on each work order.

Contractors enlisted in any category may tender for this work..............

---

*Strike out if not applicable.

3. Copies of the drawings and other documents pertaining to the work (signed for the purpose of identification by the Accepting Officers or his accredited representative) will be open for inspection by the tenderer at the office of..during normal working hours.

4. Application for tender forms must be submitted to.................... so as to reach his office on or before......................

5. Applications must be accompanied by Income Tax Clearance and Sales Tax Clearance Certificates.

6. Tender Forms and Conditions of Contract and other necessary documents will be issued to approved contractors on and after............................ 19............................on payment of a sum of Rs................. in cash.

7. Tenderers are advised to visit the site by prior appointment with the Executive/Garrison Engineer...........................and will be deemed to have familiarised themselves with the scope of the work, local conditions, drawings specifications, conditions of contract etc., before submitting their tenders.

8. Earnest money amounting to Rs .... (unless exempted by virtue of having paid a Standing Security Deposit) in Receipted Treasury Challan or Deposit at Call Receipt of a Scheduled Bank guaranteed by the Reserve Bank of India must accompany each tender.

9. Registered contractors may obtain exemption from the payment of earnest money for tenders submitted by them for any work in the Deptt. on payment of Standing Security Deposits as under :

		Rs.
B/R	Class A—unlimited	25,000
	Class B—Up to Rs. 15 lakhs	20,000
	Class C—Up to Rs. 5 lakhs	10,000
	Class D—Up to Rs. 2 lakhs	7,500
	Class E—Up to Rs. 50,000	2,500
E/M, Sanitary & Furniture		
	Class I—Unlimited.	7,500
	Class II—Up to Rs. 50,000	2,500

10. Where a contractor who has already paid the standing Security Deposit in a lower financial category is permitted to tender, the earnest money payable will be the difference between the amount of earnest money stated in para 8 and the Security Deposit already paid by him.

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11. Sealed tenders, with the name of the work inscribed thereon, will be received by the...
....
up to............................hrs. on...................19..........
and will be opened by him on the same day at..............................hrs. Tenderers who desire to be present at the time of opening tenders will be permitted to be present.

12. Tenders will be deemed to be valid for.......................months unless extended by mutual agreement.

13. Any tenderer which proposes any alteration to any of the conditions laid down or which proposes any other conditions of any description whatsoever is liable to be rejected.

14. The Accepting Officer does not bind himslelf to accept the lowest/or any tender or to assign any reasons for his action.

15. This notice of tender shall form part of the contract.

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APPENDIX IX

Rationalisation of Contract Clauses

Only some of the offending clauses of the contract have been examined in detail and suggestions given for modifying them. These are listed below :—

(1) **Time limit for payment of final bills.**—The final bill will be paid within 4 months of certified physical completion of the work. Where items of a bill are disputed, the undisputed portion (what the engineer authority feels as due to the contractor) of the bill will be paid within the stipulated period.

(2) **Basis and intervals for interim payments.**—Interim bills should be paid once a month representing the value of work done since the preparation of the last interim bill, less deductions for security etc. as laid down. The contractor shall in addition be entitled to be paid on his request up to 75% of the value of approved non-perishable materials collected at the site for incorporation in the work. Deductions will be made on account of any plant on hire or stores issued or on other account.

(3) **Suspension of work for delays due to default of employer.**—The engineer may suspend the progress of work or any part for such time he may consider, if such suspension is :

(a) provided for in the contract ;

(b) necessary for the proper execution of the work or by reason of weather conditions or by some default on the part of the contractor ; or

(c) necessary for the safety of the works or any part thereof.

The contractor, in such circumstances is not entitled to any extra cost incurred by him during the period of suspension.

If the suspension is for reasons other than these mentioned above, and if it exceeds 14 days, the contractor will be paid compensation in respect of salaries or wages paid to his employees during the period of suspension.

If the suspension is for more than 3 months, the contractor by giving written notice may treat part or the whole of the work as an abandonment of the contract by the Government.

In case of determination of contract, the contractor will be paid such claims as are deemed reasonable and are supported by vouchers. The decision of the Engineer-in-charge on the necessity and propriety of such expenditure shall be final and conclusive.

In the event of delay or failure in obtaining the required quantity of materials stipulated for issue to the contractor, the contractor shall not be deemed absolved of his responsibilities and shall keep in touch with the day to day position regarding their availability and accordingly adjust the progress of the works including the employment of labour, and the Government shall not in any way be liable for the supply of materials or the non-supply thereof for any reason whatsoever nor for any loss or damage arising in consequence of such delay or non-supply.

(4) **Compensation for delay.**—If the contractor fails to complete the work before the date(s) of completion, he shall be liable to pay compensation at 1% or such smaller amount, as the CWE/SE may fix whose decision is final, of the contract value of the item or group of items for which a separate period of completion is given in the contract for every week, that the whole of the work in respect of the item or group of items of works remain uncompleted—provided always that the total amount of compensation shall not exceed 10% of the contract value of the item or group of items.

In fit cases, bonus may be paid to contractors after the approval of the next higher technical authority for earlier completion of work. The quantum of such bonus shall not be more than 2½% of the value of the item or group of items for which separate period of completion is specified in the contract.

(5) **Defects liability period.**—The defects liability period shall not be more than 6 months after the issue of completion certificate.

(6) **Variation in prices due to Act of State.**—If during the progress of work, the price of any material incorporated in any work is increased or decreased by an Act of State, being other than a sales tax, the contract shall accordingly be varied, provided always that any increase so payable is not, in the opinion of the CWE/SE attributable to delay in the execution of the contract within the control of the contractor.

(7) **Arbitration.**—Unless the parties otherwise agree, reference to arbitration shall not take place until after the completion, alleged completion or abandonment of the work or the determination of the contract.

All disputes or differences between the parties to the contract, arising out of or relating to the contract other than a matter to which the decision of any person is by the contract expressed to be final and binding, shall after written notice by either party to the contract to the other be referred to the sole arbitration of an Engineer Officer to be appointed by the authority mentioned in the tender document.

(8) **Completion certificate.**—1. The contractor shall give notice of completion to the E.E./G.E.

2. E.E./G.E. shall within 7 days of receipt of notice from the contractor (15 days in the case of outstations) issue a Completion Certificate notifying any defects which need rectification.

3. No certificate of completion shall be issued until the contractor has cleared all scaffolding, surplus materials, huts etc. from the site and delivered it clean and tidy to the satisfaction of the Engineer-in-Charge, except when such scaffolding, materials, etc. are required for the rectification of defects.

4. Where separate periods of completion have been specified for items or groups of items, the Engineer-in-Charge may issue separate completion certificates for such items or groups of items and the defects liability period shall commence from the date of issue of such certificates.

(9) **Deviation/Variations—Extent of.**—No work that radically changes the original nature and scope of the contract shall be ordered as a deviation. For this purpose, any changes ordered which lie within the limits of deviations described here under shall be deemed to be within the scope of the contract. Variations in excess of the permissible limits will constitute an amendment to the contract requiring the agreement of both parties to the contract.

The accepting Officer, or person specially authorised by him on his behalf, may vary either by way of addition to and/or deduction from the works so described provided that the contract sum be not thereby varied on the whole by more than the percentage (referred to below as the Deviation limit) prescribed hereunder :

Contracts up to Rs. 10 lakhs	15%
Contracts of Rs. 10 lakhs & over	10%

The deviation limit shall be subject to the following restrictions:—

(a) The deviations ordered on items of any *individual trade included in the contract shall not exceed 25% of the value of that trade in the contract as a whole or 10% of the Deviation limit whichever is more, except in the case of †Prime Cost and @Provisional items, where the parties to the contract may agree to a different percentage for any particular item.

(b) The value of additions of items of any individual trade not already included in the contract shall not exceed 10% of the Deviation limit.

(10.) **Deviations/Variations—Pricing.**—The rate of payment for an item of work covered by a Deviation order shall be determined in the following manner and in the order of precedence stated for each type of contract :—

(A) *Lump Sum Contracts based on Bills of Quantities i.e. (BQ)*

(a) at the applicable rate in the BQ for the building/item of work in which the deviation is involved, failing which, at the lowest applicable rate in any other BQ forming part of the contract.

(b) at the proportionate rate directly determined from the lowest rates of analogous items in the relevant BQ, failing which from the lowest rates of analogous items in any other BQ forming part of the contract.

(c) at a proportionate rate derived from the lowest rate of an analogous item in the relevant BQ, or failing which from the lowest rate of an analogous item in any other BQ forming part of the contract ; and analogous items in the Standard Schedule of Rates.

(B) *Lump Sum Contracts based on Pre-priced Schedule ‡of Works*

(a) At rates specified in the Schedule of works,

(b) at a proportionate rate derived from the rates specified in the Schedule of works,

(c) at applicable rates in the Standard Schedule of Rates,

(d) at a proportionate rate based on analogous items in the Standard Schedule of Rates.

The rates at (a) and (d) above shall be subject to the contractor's percentage.

**Individual trade.*—The term individual trade refers to that particular section of the Standard Schedule of Rates where the item in question occurs or is directly related.

†*Prime Cost & Prime cost sums* and the letters"p.c."or a combination of the same mean the amount actually paid by the contractor for any article, commodity or special work and include all proper charges for packing, carriage and delivery to the site, after deduction of all trade discounts rebates and allowances and all discounts obtainable for cash in so far as such discounts exceed 2½ per cent.

@*Provisional items* mean items for which approximate quantities have been included in the tender documents.

Δ"B.Q." is an abbreviation for the term "Bills of Quantities". The Bills of Quantities refer to the list of items comprising a work arranged in the manner laid down in the Standard method of measurement.

‡In a "*Pre-priced schedule*" the department works out the cost of the tender based on the rates given in the Standard Schedule of Rates.

(C) *Lump Sum contracts based on Drawings & specifications and measurement contracts based on Item Rates.*

(a) At rates specified in the contract.

(b) at a proportionate rate directly determined from the rates specified in the contract.

(c) at a proportional rate derived from an analogous item specified in the contract and analogous items in the Standard Schedule of Rates.

(d) at applicable rates in the Standard Schedule of Rates.

(e) at a proportionate rate based on analogous items in the Standard Schedule of Rates.

The rates at (d) & (e) above shall be subject to the percentage inserted in the tender documents for pricing deviations.

(D) *Measurement (Percentage Rate) and Term Contracts.**

(a) at applicable rates in the Standard Schedule of Rates.

(b) at proportionate rates based on analogous items in the Standard Schedule of Rates.

The rates at (a) & (b) above shall be subject to the contractors' percentage.

(E) *Contracts comprising Sections/Parts conforming to types (A) to (D) above.*

The principles enunciated in Para (A) to (D) shall apply to the corresponding parts of the contracts.

NOTE.—A proportionate rate directly determined from other rates shall be deemed to imply a rate obtained by direct proportion without recourse to analysis.

(F) *All contracts.*

If any work, the rates for which cannot be obtained by any of the methods referred to in paras (A) to (D) above, has been ordered on the contractors, the rate shall be decided by the Garrison/Executive Engineer on the basis of the cost to contractor at the site of works plus 10% to cover all overheads and profit. Provided that if the contractor is not satisfied with the decision of the Garrison/Executive Engineer, he shall be entitled to represent the matter to the CWE/SE within seven days of the receipt of the Garrison/Executive Engineers' decision and the decision of the CWE/SE thereon shall be final and binding.

If any alterations or additions (other than those authorised to be executed by day work† or for an agreed sum) have been covered up by the contractor without his having given notice of his intention to do so, the Engineer-in-Charge shall be entitled to appraise the value thereof and in the event of any dispute the decision of the Garrison/Executive Engineer thereon shall be final and binding.

(11) **Determination of Cancellation of Contract for default by Contractors—Powers and Penalties.**—1. The Accepting Officer may by written notice cancel the whole or part of a contract due to failure or default of a contractor.

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*"*Term contract*" is one in which a contractor is required to carry out all the work pertaining to a specified area during a specific period at a percentage above or below the Standard Schedule of Rates.

†*Daywork* means items of labour and/or materials which, in the opinion of the Engineer-in-Charge, are not capable of being evaluated by the accepted methods of measurement of assessment.

2. The Accepting Officer shall, on such cancellation have powers to :

(a) Forfeit the security deposit of the contractor;

and/or (b) take possession of the site and any materials, construction plant, implements, stores etc. thereon ;

and/or (c) carry out the incomplete works, by any agency at the risk and cost of the contractor.

3. On completion of the works, the Engineer-in-Charge shall determine what payment, if any, is due to/from the contractor. In determining the amount, credit shall be given to the contractor for the value of work executed by him up to the time of cancellation and the value of contractor's materials taken over and incorporated in the works.

4. Any excess expenditure incurred by the Government after allowing such credit shall be recovered from any moneys or amounts due to the contractor,, on any other account, failing which the contractor shall be called upon in writing to pay within seven days the excess expenditure incurred in completing the work.

5. If the contractor shall fail to pay the required sum within 7 days, the Engineer-in-Charge shall have the right to sell any or all the unused materials, constructional plant, implements, temporary buildings etc. and apply the proceeds of sale thereof towards the satisfaction of any sums due from the contractor under the contract.

6. Any sums in excess of the amounts due to the Department and unsold materials, constructional plant etc. shall be returned to the contractor, provided always that if the completion cost of the whole work is less than the amount which the contractor would have been paid had he completed the whole work, such benefit shall not accrue to the contractor.

(12) **Determination of Contract due to Abandonment or Reduction of scope of work.**—If at any time after the acceptance of the tender, Government shall for any reasons whatsoever not require the whole or any part of the works to be carried out, the Accepting Officer shall give notice in writing to the Contractor who shall have no claim to any payment of compensation or otherwise whatsoever on account of any profit or advantage which he might have derived from the execution of the whole of the works.

The contractor shall be paid at contract rates for the full amount of work executed and in addition :—

(a) the cost at site of all surplus approved materials collected for incorporation in the work, which the contractor does not wish to retain and which shall thereafter become the property of the Government.

(b) Where contractor desired to retain the surplus of approved materials (excepting materials supplied by Govt. which shall in any case be returned to the Govt.) the cost of handling and cartage charges for removal from the site.

(c) If upon the determination of the contract under this condition the contractor is of opinion that he has suffered hardship by reason of the operation of this condition he may refer the circumstances to the accepting authority who, on being satisfied that such hardship exists or has existed shall make such allowance, if any as in his opinion is reasonable, and his decision shall be final and conclusive.

Only such of the above claims as are deemed reasonable and are supported by vouchers shall be admitted by the Accepting Officer.

(13) **Rectification of Defects.**—The contractor is liable to make good at his cost, any defects, which may appear during the progress of the work or during the maintenance period, arising in the opinion of the Engineer-in-Charge from materials or workmanship not in accordance with the drawings or specifications or instructions of the Engineer-in-Charge. In case of default on the part of the contractor the Engineer-in-Charge may employ any other agency to make good such defects and all expenses consequent thereon plus departmental charges at the rate of 20% shall be borne by the contractor and shall be recoverable from any money due to him.

The following clause should not be incorporated in the conditions of contract, but may be followed in practice in exceptional cases only :—

The Engineer-in-Charge under the orders of the Accepting Authority (where he is not the same) and in every case under intimation to the next higher authority should be authorised to accept a work, which is not up to specifications but is otherwise structurally sound, and to make payment therefor on a reduced rate.

(14) **Decisions final and binding.**—In respect of clauses where the Engineer-in-Charge/Executive Engineer/Superintending Engineer have been empowered to give decisions on certain points, coming under the purview of these clauses, and in case of disagreement between that officer and the contractor in such matters, the matter shall be referred to the higher authority (*i.e.* higher to the one mentioned in the said clauses) and the decision so given shall be final and binding on both the parties.

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APPENDIX XII

'Application of Line of Balance Technology'

The Pamphlet captioned "Planning and Programming of Works—Application of L.O.B." published by the COPP deals in full length with the technology and the multifarious applications of the technique.

A brief resume is given for ready reference.

The L.O.B. study comprises the following 4 steps listed in the sequence in which each is developed :

(1) The objective.

(2) The programme-production or construction plan.

(3) Programme progress which indicates the status of performance at a particular point of time.

(4) The line of balance which gives a visual comparison of the progress with the objective in view.

The objective is normally set out by the authorities responsible for sponsoring the project. For example, in the construction project exhibited in the annexure the objective is that 50 residential units should be constructed within a period of 32 months, at the rate of 15 units in 16 months, 25 units in 24 months and 50 units in 32 months according to the sponsoring agency.

The next step is programming which is the key part of the process. The programme should cover all the key items from the initiation of the work to its completion. The criteria for selecting the "Key items or control points" is not so much with financial implication but the limiting and halting influence they have on the programme as a whole. We may cite the example of sewage pumps or bearings of bridges, the cost of which may not be significant compared to the cost of the programme as a whole. After selecting such points the lead time for each has to be calculated in a realistic way. Allied to the lead time is the "time coverage" for each constituent.

The annexure shows that the time coverage for cement is more than that of steel even though the lead time is the same. This is dictated by the construction process and helps in budgeting for material and ordering out the supplies according to a phased programme.

The terms "Lead time" and "Time coverage" may be explained as follows : The point of initiation of a task reckoned from the point of completion of the work is called the "Lead time" of a particular task. Again an internal time relationship is established between all the tasks in the programme. This indicates the point of initiation as well as the point of completion of the task, all in terms of time. The duration between the points of commencement and completion in respect of any task is known as "Time Coverage" of the particular task.

The third step in the study is the depiction of progress in the progress chart for the same number of tasks, otherwise called control points or constituents of the programme. The vertical bars which are constructed to indicate the levels of performance on each task are known as the status bars. The status bars are constructed depicting the physical progress on each task either from personal knowledge or from information gathered from the field through progress reports.

The next step is the drawing up of the L.O.B. which will indicate at any given point of time, the predetermined levels of activity at each control point.

The methodology of constructing the L.O.B. is illustrated with an example given below :—(See drawing on page 103.)

A construction work is in progress from 1-1-61. The objective is to complete 40 units by 31-12-61 *i.e.*, in a period of 12 months. The programme has been framed in the manner as explained above. This consists of four constituent elements namely supply of cement, steel, construction and finishing, including electrical and sanitary installations. The end item is the finished product which is also affixed with a number. The contract schedule has been depicted in the objective Chart.

Presume that the executive inspects the work on 31st August, 1961. Precisely it should be possible for him to know the progress that should be obtaining on the four constituents and what actually obtains on that day. The former is given by the L.O.B. and the latter by the status bars constructed with feed back information.

The study date is 31st August, 1961. To know the progress that should be obtaining on task No. 1 set off four months *i.e.*, the lead time of task No. 1 from the study date to the right on the horizontal axis of the objective chart. Then draw a vertical line to meet the contract schedule. From the point of intersection, draw a horizontal line to cross the bar relating to task No. 1 and this gives the predetermined level of activity on the particular day of the particular task. Similarly to know the progress that should obtain on task No. 2 set off four and a half months to the right from the study date on the horizontal axis and then draw a vertical line to meet the contract schedule and draw a horizontal line from the point of intersection to cross the bar relating to task No. 2. Repeat the process for every task. The horizontal bars thus obtained may be connected with vertical lines to form a staircase pattern of line, which is the Line of Balance.

The line of balance can be drawn even before the commencement of the construction activity for desired intervals of time. The line of balance at any time will show the level of activity that should have been attained at all the control points in order to be "in phase" with the target. When the actual progress of various items is measured against this line of balance, it will be easy to see whether the whole project is going in tune with the target or not. If the progress is above the line of level it will indicate expenditure ahead of utility. In such cases the authority concerned can take a conscious view whether such expenditure should be committed or restricted and the money diverted elsewhere for more profitable use. On the other hand, if the progress is below the line it should be easily inferred that the project is not going in phase with the target. Certain remedial measures will be necessary and those will be taken in time.

The main advantages of this method of programming and progressing are (1) It enables the planner to think clearly of all controlling points in the programme and of the lead time and the time coverage for each ; (2) the lead time and time coverage have to be based on judgment taking into account the prevailing situation. If certain anticipations do not come true, then the planner can give a reasoned argument for short falls if any in the programme ; (3) it gives a visual idea of the position of the projects as a whole at any point of view. This enables remedial measures to be taken in time avoiding thereby spreading of expenditure on a number of items which will not be completed or commit expenditure of certain items ahead of utility ; (4) it helps in the recasting of projects if certain expectations do not come true. Such recasting can be done in a more realistic manner by the use of this technique ; (5) another advantage is that it enables different levels of administration to view the project on a common basis. The basis of construction is the same but the point of consideration may be different to suit different responsibilities. A well co-ordinated view therefore is possible ; (6) the analytical approach engendered by this technique facilitates working out of staff requirements ; (7) it helps envisage the limitations of the programme for achieving the desired objective and to concentrate on them from the very beginning ; alternatively it enables changes to be introduced in the method of work or organisation if they happen to be limiting factors in the attainment of targets.

A practical application of this technique highlighted certain other advantages that can accrue from a programme chart. In the absence of a programme chart, one is apt to be confounded by the maze of figures, target dates and delivery schedules and may very well concentrate on items which may not have a halting influence on the programme and leave out others which may have a vital bearing on the successful completion of the project. This was actually what was happening in a manufacturing project which the committee on Plan Projects had an occasion to study recently. The authorities were unduly worried about the placing of indents for raw materials so that the factory may commence production by the middle of 1963, but when the programme was chalked out on a time scale, the different elements being linked in proper sequence, it was clear that the indenting of raw materials could even be done in April 1962 without affecting the set up for the commencement of manufacture. It was the civil construction programme which had a vital influence on the successful completion of the project as any delay there would lead to delay in erection of machinery and postponement of production. The emphasis was, therefore, given on the wrong place, which however, could not be helped in the absence of a visual appreciation of the programme. The programming method suggested in the "Line of Balance Technique" at once gives a pictorial representation of the programme in the background of time which enables quicker apprehension of the halting influences.

The line of balance technique, therefore, is a very handy tool in the hands of those who are incharge of planning, programming and controlling of projects. A knowledge of this method, it is hoped would go a long way in reducing the ever widening gulf between the financial commitment and the realisation of physical assets.

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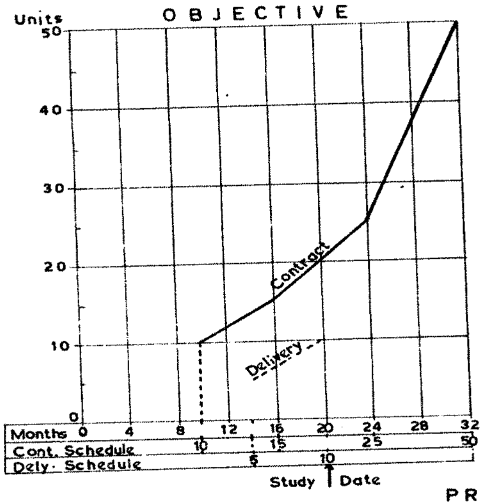

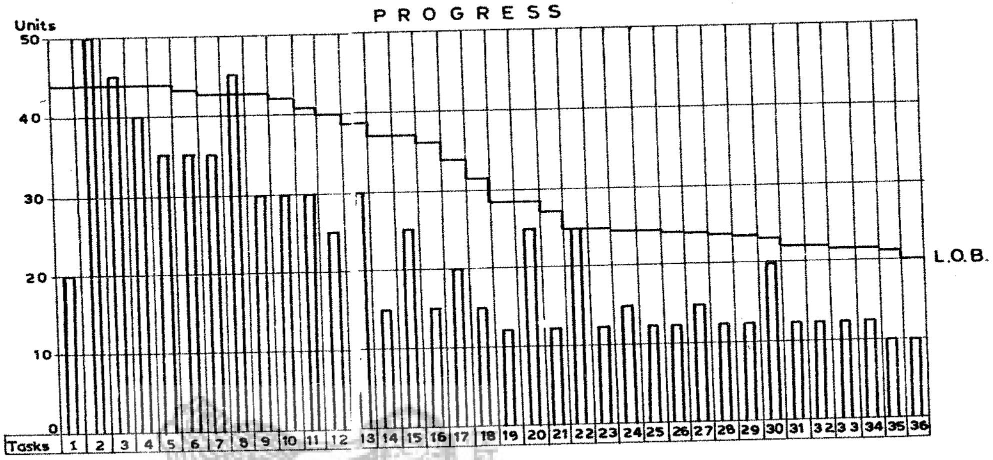

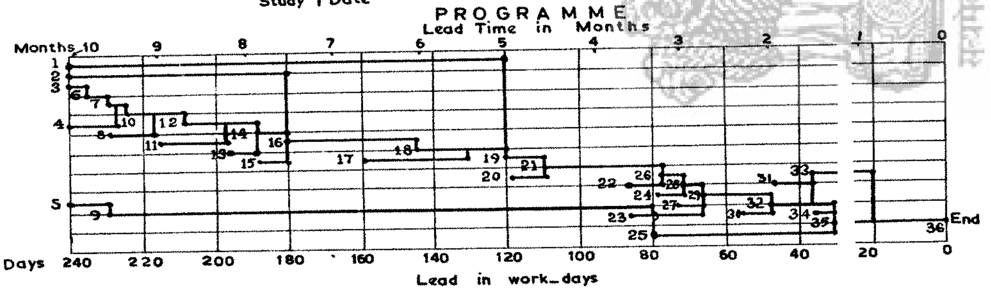

CONSTRUCTION OF RESIDENTIAL UNIT.

The chart depicts the process of planning, progressing and controlling th construction of 50 residential units. This is given to illustrate the methodology of progra ning construction projects incorporating a comprehensive list of operations to ir ease the sensi-tiveness of the programme. The programme envisages the coordination different agencies like builders, electricians and plumbers. The programme, thus, intr uces the aspect of 'phasing' in programming.

Legend for Tasks in Programme

1. Procurement of Cement.
2. Procurement of Steel.
3. Preparation of Site.
4. Collection of Material for Foundation Concrete.
5. Procurement of Timber.
6. Earthwork in Foundation.
7. Laying Concrete in Foundation.
8. Collection of Material for construction upto Plinth.
9. Making Door & Window Frames.
10. Construction upto Plinth.
11. Collection of Material for Superstructure – Ground Floor.
12. Construction in Superstructure – Ground Floor.
13. Procurement of Centering Materials.
14. Centering for Roof – Ground Floor.
15. Collection of Material for Roof – Ground Floor.
16. R.C.C. Roofing and Curing-Ground Floor.
17. Collection of Material for Superstructure – First Floor.
18. Construction in Superstructure – First Floor.
19. Centering for Roof – First Floor.
20. Collection of Material for Roof – First Floor.
21. R.C.C. Roofing and its Curing – First Floor.
22. Collection of Water-proofing Materials for Roof.
23. Plastering – Internal Faces.
24. Collection of Materials for Parapet.
25. Making & Fixing of Shutters for Doors and Windows.
26. Water-proofing of Roof.
27. Collection of Material for Plastering External Faces.
28. Construction of Parapet.
29. Plastering – External Faces.
30. Collection of Material for Flooring.
31. Electrification.
32. Flooring.
33. Plumbing.
34. Collection of Finishing Materials.
35. Finishing & Clearing Site.
36. End.

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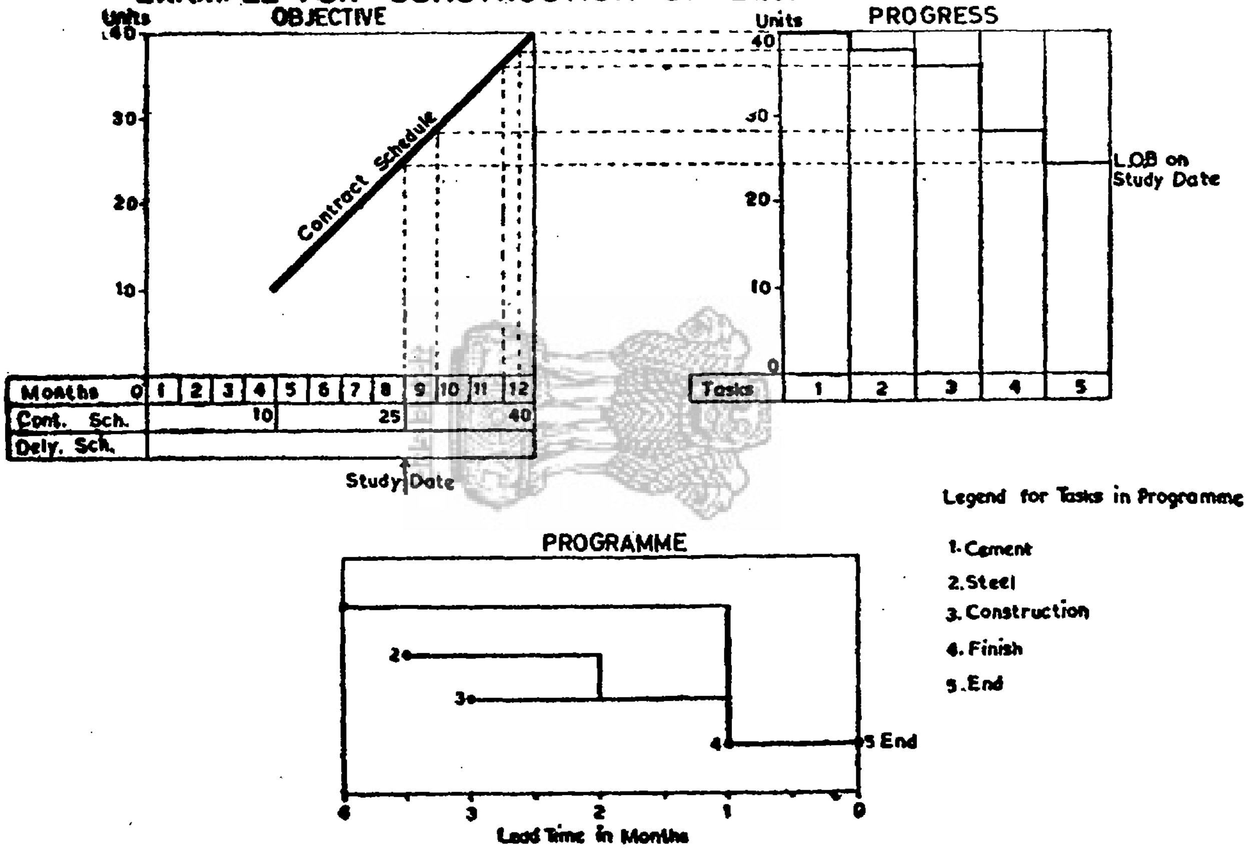
EXAMPLE FOR CONSTRUCTION OF LINE OF BALANCE



APPENDIX XIII

Schedule of Powers

Sl. No.	Description of Powers	Chief Engineer	Superintending Engineer	Executive Engineer	Assistant Engineer	Remarks
1	Powers to accord administrative approval—					
	(*a*) Buildings and Roads—					
	(*i*) Original work .	Rs. 20,000	No Powers	No Powers	No Powers	
	(*ii*) Repairs . .	No administrative approval is required.	..	..	..	
	(*b*) Tools and Plants .	No administrative approval is required.	..	..	..	
	(*c*) (*i*) Furniture (works).	Rs. 20,000	No Powers	No Powers	No Powers	
	(*ii*) Office Furniture	Rs. 5,000 per annum for furnishing one office including his own office.	Rs. 2,500 per annum for furnishing one office including his own office.	No Powers	No Powers	

	(*d*) Live Stock (Sanction).	Rs. 500	No Powers	No Powers	No Powers
	(*e*) Accord of administrative approval to estimates for additions and alterations to existing :—				
	(*i*) Residential Buildings.	Rs. 1,250 in each case.	Rs. 500 in each case.	No Powers	No Powers
	(*ii*) Non-Residential Buildings.	Rs. 20,000 in each case.	Rs. 10,000 in each case.	No Powers	No Powers
2	Powers regarding excess over administrative approval.	Up to 10% of the administrative approval.	Up to 10% of the administrative approval subject to limit of powers of technical sanction.	Up to 10% of the administrative approval subject to limit of powers of technical sanction.	No Powers
3	(*i*) Powers to accord technical sanction to detailed estimates. Original works (buildings).	Full Powers	Rs. 5 lakhs	Rs. One lakh	Asstt. Engineer Independent Sub-Division—Rs. 20,000;other Asstt. Engineers—Rs. 5,000.
	(*ii*) Repairs (buildings).	..	Full Powers	Rs. One lakh	Ditto.
	(*iii*) Roads Original	Full Powers	Rs. 5 lakhs	Rs. One lakh	Ditto.
	(*iv*) Roads Repairs .	..	..	Full Powers	Ditto.
	(*v*) Furniture . .	Full Powers	Rs. 5 lakhs	Rs. One lakh	Ditto.

APPENDIX XIII—(*Contd.*)

Schedule of Powers

Sl. No.	Description of Powers	Chief Engineer	Superintending Engineer	Executive Engineer	Assistant Engineer	Remarks
	(*vi*) Tools and Plants (ordinary).	Full Powers*	Rs. 5 lakhs*	Rs. One lakh*	Asstt. Engineer* Independent ub-Division—Rs. 20,000 other A.Es.—Rs. 5,000.	*Subject to allotment of funds.
	(*vii*) Technical sanction to component parts of a project.	Same powers as their powers to accord technical sanction to an original estimate.		..	..	
4	Passing of excess over estimates technically sanctioned.	5% of the original estimate.	5% of the original estimate provided the excess is within his powers to accord sanction to an original estimate.	5% of the original estimate provided the excess is within his powers to accord sanction to an original estimate.	5% for his own estimates.	The Superintending Engineers, Executive Engineers and Asstt. Engineers may pass excess expenditure within a limit of Rs. 2,500, Rs. 1,000 & Rs. 250 respectively on sanctioned original works and repairs irrespective of the total amount of the sanctioned estimate.

5	Technical sanction to revised estimates.	Same powers as their powers to accord technical sanction to an original estimate.		..	..
6	Passing of excess over revised estimates.	Up to 5% of the revised estimates.	Up to 5% of estimates sanctioned by himself or lower authority. No powers over revised estimates sanctioned by higher authorities.	Up to 5% for estimates sanctioned by himself or lower authority. No powers over revised estimates sanctioned by higher authorities.	Up to 5% for estimates sanctioned by himself.
7	Powers to charge cost of petty and miscellaneous items of work normally classified as original works to repair—				
	(*a*) Buildings .	..	Rs. 1,000 for non-residential buildings & Rs. 200 for residential buildings.	No Powers	No Powers
	(*b*) Roads . .	..	Rs. 25,000 for roads provided no land acquisition is involved.	No Powers	No Powers
8	Approval of tender documents.	Same powers as their powers to accord technical sanction to estimates.		..	..
9	Acceptance of tenders.	Full Powers . .	Up to Rs. 10 lakhs when the tender excess is below 5%.	Up to his powers of technical sanction.	Up to his powers of technical sanction.

APPENDIX XIII—(*Contd.*)

Schedule of Powers

Sl. No.	Description of Powers	Chief Engineer	Superintending Engineer	Executive Engineer	Assistant Engineer	Remarks
10	Award of work by open negotiation where no tender has been received.	Full Powers . .	Up to Rs. 2 lakhs. More than Rs. 2 lakhs & up to Rs.5 lakhs subject to prior approval of C. E.	Up to his powers of technical sanction subject to prior approval of the next higher authority.	Up to his powers of technical sanction subject to prior approval of the next higher authority.	
11	Award of work to contractors other than the lowest.	Full Powers . .	Up to Rs. 10 lakhs when the tender excess is below 5% subject to intimation to next higher authority.	Up to his powers of technical sanction subject to intimation to next higher authority.	Up to his powers of technical sanction subject to intimation to next higher authority.	
12	Power to sign agreements.	Full Powers . .	Full powers for tenders accepted by him or higher authority provided he calls the tenders.	Full powers for tenders accepted by him or higher authority provided he calls the tenders.	Up to Rs. 5,000	
13	Powers to award work without call of tenders or by negotiation.	Rs. 10,000 in each case and from Rs. 10,000 to Rs. 50,000 in respect of emergent works only for which	Rs. 7,500 in each case and up to Rs. 10,000 in emergent cases for which reasons should be recorded	Rs. 5,000	Rs. 1,000	

		reasons should be recorded.	and intimated to next higher authority.		
14	Powers to divert savings to other sub-works or sub-head of the same work.	..	Full powers to divert savings from one part to another part of the estimate. Full powers to divert provision under contingencies to new works not included in the original estimate if such work is also contingent on the main work. Excess of more than 10% over the amount included in the Administrative approval for a residential building forming part of a larger project may not be sanctioned by S. E.	Up to Rs. 2,500 .	No Powers
15	Powers to sanction Extra/Substituted items & variation in quantities.	Full Powers . .	Full powers for his own contracts. 5% of contract amount or Rs. 50,000 whichever is less in case of agreements accepted by higher authority.	Full powers for his own contracts and in case of agreements accepted by higher authorities subject to delegation by Heads of Deptts.	5% of the tendered amount accepted by him.

APPENDIX XIII—(*Contd.*)

Schedule of Powers

Sl. No.	Description of Powers	Chief Engineer	Superintending Engineer	Executive Engineer	Assistant Engineer	Remarks
16	Powers to allow variation in quantities in case of abnormally high or low rates by more than 5% (Variation in rates by more than 25%).	Full Powers	For agreements accepted up to E.E.'s level-full powers. For his own agreements C.E.'s approval is required.	Full powers in respect of agreements accepted by A.Es. For his own agreements S.E.'s approval is required.	No Powers	
17	Passing of First and Final Bills.	..	..	Full Powers	Rs. 2,500	
18	Passing of running account bills.	..	..	Full Powers	Rs. 5,000 for works every month and every 3rd bill to be pre-checked by the S.A.S. Accountant.	
19	Passing of bills of work-charged Estt.	..	..	Full Powers	Full after pre-check by the S.A.S. Accountant.	

20	Direct purchase of Stores, T. & P. etc. for which there are no rate or running contracts excluding classes of stores enumerated in para 2 of Part II of App. 9 to G.F.R., Vol. II.	Where there is separate organisation to deal with Govt. Purchases, Rs. 10,000 per item per purchase without any overall annual limit. Otherwise full powers.	Where there is separate organisation, to deal with Govt. purchases ; Rs. 5,000 per item per purchase without any overall annual limit. Otherwise up to his powers of acceptance of tenders.	Where there is separate organisation to deal with Govt. purchases; Rs.1,000 per item per purchase subject to a limit of Rs.10,000 per annum. Otherwise, up to his powers of acceptance of tenders.	No Powers
21	Direct purchase of stores for which D.G.S.&D. or running rate contracts exist.	..	..	Up to a limit of Rs. 100 in each case but not exceeding Rs. 1,000 a year.	No Powers
22	Purchase of stores through stores Deptts.	..	Full Powers	Full powers for sanctioned works & up to Rs.10,000 for stock.	No Powers
23	Purchase of books .	Full Powers	Rs. 250 per annum	Rs. 100 per annum	No Powers
24	Powers to sanction employment of work charged establishment.	Up to Rs. 500 per month in each case.	Up to Rs. 300 per month in each case.	Up to Rs. 150 per month in each case.	Up to Rs. 60 per month in each case.
25	Charges for shifting telephones. (Residence to Residence; office to office).	Full Powers	Full Powers	Full powers for his own and subordinate offices.	No Powers

APPENDIX XIII—*Contd.*

Schedule of Powers

Sl. No.	Description of Powers	Chief Engineer	Superintending Engineer	Executive Engineer	Assistant Engineer	Remarks
26	Charges for installing telephones.	Full for office. No powers for residence.	No Powers	No Powers	No. Powers	
27	Charges for installing extension of telephones.	Full for office. No Powers for residence.	No Powers	No Powers	No Powers	
28	Sanction to payments under Workmen's compensation Act.	Full Powers	Full powers with the approval of commissioner of Labour.	No Powers	No Powers	
29	Powers to create a Section.	Full Powers	No Powers	No Powers	No Powers	
30	Powers to create a sub-Division.	One sub-Divn.in addition to the sanctioned strength for additional work of not less than Rs. 5 lakhs per annum.	No Powers	No Powers	No Powers	
31	Powers to close a Divn. or sub-Division.	Full Powers	No Powers	No Powers	No Powers	

32	Powers to open a Divn. or sub-Divn. within the authorised strength.	Full Powers	No Powers	No Powers	No Powers
33	Powers of transfer and posting of officers.	Full Powers upto E.E.'s level.	Full Powers up to A.E.'s level within a circle.	Full Powers up to section officers within the Division.	No Powers
34	Powers to grant T.A. to work-charged establishment.	. .	. .	Full Powers	No Powers
35	Powers to sanction expenditure for inauguration of works.	Rs. 2,500 in each case.	No Powers	No Powers	No Powers
36	Powers to fix percentage rates for maintenance of buildings.	Full Powers	No Powers	No Powers	No Powers
37	Powers to fix the reserve stock limit for a division.	Full Powers	10% excess for each Division subject to ceiling for his circle.	No Powers	No Powers
38	Powers to create permanent posts.	Full Powers for class III & classIV posts for sanctioned divisions and sub-divisions.	No Powers	No Powers	No Powers

APPENDIX XIII—*Contd.*

Schedule of Powers

Sl No.	Description of Powers	Chief Engineer	Superintending Engineer	Executive Engineer	Assistant Engineer	Remarks
39	Powers to create temporary posts.	Full for Assistant Engineers, Ministerial posts, section officers and peons.	No Powers.	No Powers.	No Powers.	
40	Powers for the sale and/or demolition of buildings.	Book value of Rs. 10,000/-.	Book value of Rs. 5,000/-.	Book value of Rs. 1,000/-.	No Powers.	1. No building should be sold unless it has been previously ascertained that it is not required by any Deptt. of the Govt. 2. No building should normally be demolished unless it is in a dangerous condition or past repairs or it is necessary to vacate the site for constructing a more important Govt. building or structure.

41	Letting out Govt. buildings on rent.	..	..	Full powers where standard rents have already been fixed.	No powers.	
42	Use of public buildings as residence.	..	Full Powers.	No Powers.	No Powers.	
43	Hiring of accommodation for departmental use—		•			
	(a) for Office	Rs. 7,500 per annum in Calcutta, Bombay & Madras & up to Rs. 500 per month in other places.	Rs. 100 per month.	Rs. 30 per month.	No Powers.	We recommend that the P.W.D. may give certificate of reasonableness of rent when the accommodation is hired by other Deptts. for their use and the P.W.D. may not take upon them the work of such hiring.
	(b) For office-*cum*-residence.	Rs. 400 per month in Calcutta, Bombay, Madras and Rs. 350 per month in other places.	No Powers.	No Powers.	No Powers.	
	(c) For residence & other purposes.	Up to Rs. 300 per month.	No Powers.	No Powers.	No Powers.	
44	Powers to undertake deposit Works.	Full Powers.	Rs. 1 lakh.	Rs. 10,000.	No Powers.	
45	Powers to write off measurement books	Full Powers.	No Powers.	No Powers.	No Powers.	

APPENDIX XIII—*Contd.*

Schedule of Powers

Sl. No.	Description of Powers	Chief Engineer	Superintending Engineer	Executive Engineer	Assistant Engineer	Remarks
46	Powers to accept awards by Arbitrators.	Full Powers.	No Powers.	No Powers.	No Powers.	
47	Powers to incur expenditure in connection with participation in exhibitions.	Rs. 5,000.	Rs. 1,000.	No Powers.	No Powers.	
48	Powers to sanction legal charges.	Full powers subject to the scales fixed by Government.	No Powers.	No Powers.	No Powers.	
49	Powers regarding sale and write off of Stores—					
	(a) Losses due to depreciation of* stock, and damage due to an act of God, Fire or other calamities.	Full Powers.	Rs. 25,000.	Rs. 5,000.	No Powers.	*The term 'Losses due to depreciation' may be : (*i*) Losses due to fluctuation in market prices. (*ii*) Losses due to deterioration.

	(b) Losses on stores due to theft, fraud or negligence of individuals.	Rs. 5,000 in each case.	Rs. 1,000 in each case.	No Powers.	No Powers.	
	(c) Declaring stores other than those referred to under (a) & (b) surplus or unserviceable, the purchase price being estimated if not known.	Rs. 50,000.	Rs. 20,000.	Rs. 5,000.	No Powers.	In issuing their orders the method of disposal shall be specified.
	(d) Write off of T.&P. articles of which present* value has been recovered.	..	..	Full Powers.	No Powers.	*Present value means market value minus depreciation based on the condition of the article.
	(e) Write off of T.&P. articles of which part value has been recovered.	Rs. 20,000.	Rs. 10,000.	Rs. 1,500.	No Powers.	
50	Powers to grant extension of time.	Full powers.	Full powers.	Full powers in cases where tenders were accepted by him and the A. E. plus up to ⅓ of the stipulated time in respect of cases where the tender is accepted by S. E.	Up to ⅓ of the stipulated period in respect of tenders accepted by him.	

APPENDIX XIII—*Contd.*

Schedule of Powers

Sl. No.	Description of Powers	Chief Engineer	Superintending Engineer	Executive Engineer	Assistant Engineer	Remarks
51	Powers to fix the quantum of compensation levied on the contractors for not completing the work in time.	Full Powers.	Full Powers.	Full powers in cases where tenders were accepted by him and the A.E. plus up to $\frac{1}{3}$ of the stipulated time in respect of cases where the tender is accepted by S. E.	No Powers.	

APPENDIX XIV

Percentages for Maintenance of Govt. Buildings (C.P.W.D.)

	For Buildings constructed up to 31-3-42	For Buildings constructed from 1-4-42 to 14-8-47	For Buildings constructed on or after 15-8-47
Annual Repairs			
Non-Residential Buildings			
(*a*) Monumental type, Permanent office buildings	0·65	..	0·25
(*b*) Other Permanent buildings	2·75	1·75	0·75
(*c*) Temporary buildings	2·5	2·5	2·00
Residential Buildings			
(*a*) Permanent	3·00	2·00	1·50
(*b*) Temporary	3·5	2·75	4·00
Special Repairs			
Monumental Type	0·25	..	..
Permanent	1·00	0·75	0·50
Temporary	1·50	1·00	1·00
Annual Repairs (Electrical)	9·00	8·00	5·00
Special Repairs (*Electrical*)			
With fans	3·50	3·25	2·00
Without fans	2·00	1·75	1·50

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APPENDIX XV

Flow Chart of Existing Stores Accounting Procedure

Receipt of Stores

1. Receipt of Material
2. Entry in Measurement Book
3. Entry of Quantity in Register of Stock Receipts. (Form 8)
4. Preparation of Abstract of Receipts in C. P. W. A. 9 at the close of the month.
5. Posting in Half Yearly Return of Stock. (Form 11)

Issue of stores

1. Preparation of Indent by Indenting Division in Triplicate.
2. Handing over the Indents to Section Officer/Contractors' representative (2 copies).
3. Scrutiny of Indent in Central Stores and Issue order.
4. Issue of Material
5. Evaluation of Indent & Invoice with issue rate by the store keeper.
6. Entry of Quantity in Register of Stock Issues. (Form 8)
7. Preparation of Abstract of Issue in C.P.W.A. 10 at the close of the month.
8. Posting in Half Yearly Return of Stock. (Form 11)

APPENDIX XV

Financial Accounting

Receipt of Abstract of receipts/Abstract of issues/with valuation statements in Divisional office.

1

Check in Divisional office

2

Issue of A. T. D.

3

Posting in Half Yearly Register of Stock.

(Form 12)

4

Closing of Half Yearly Register of Stock.

(Form 12)

5

Enquiry about market rates

6

Fixing of future issue rates

7

Valuation of each item of stock at current and future issue rates.

8

Working out of profit and loss

9

Carry over of the items in the next Half Yearly Register of Stock.

10

APPENDIX XVI

Flow Chart of Proposed Stores Accounting Procedure

Receipt of Stores

Receipt of Material

1

Entry in Goods Received Sheets.

2

Entry in Stock Record Cards

3

Preparation of Abstract of Stores received.

4

Issue of Stores

Preparation of Indent by Indenting Division.
(4 copies)

5

Handing over the Indents to Section officer or Contractor's representative.
(3 copies)

6

Scrutiny of Indents and Issue order by S. D. O.

7

Issue of Material

8

Entry in Stock Record Card

9

Evaluation of Indent & invoice with Issue rate.

10

Preparation of Goods Issued Sheets.

11

Preparation of Abstract of Stores issued.

12

APPENDIX XVI

Financial Accounting

1. Daily receipt of Goods Received Sheets and Goods Issued Sheets.

2. Posting in Stores Ledger

3. Posting in Division-wise Ledger

4. At the close of the month receipt of Abstract of Stores Received & Issued in the Division.

5. Revision of issue rates every year

6. Working out of profit & loss

APPENDIX XVII

List of works for which the S. A. S. Accountant may be made wholly responsible

(1) Passing of Bills of work charged Establishment.

(2) Leave Accounts.

(3) Periodical Increment Certificates.

(4) Preparation of Pension Papers.

(5) Verification of Service Books.

(6) Contributory & General Provident Fund Accounts.

(7) Contributory Health Services—Papers regarding.

(8) Assessment & Recovery of Rent.

(9) Press Notice of Tenders.

(10) Railway Receipt Register.

(11) Electric & Water Supply Bills.

(12) Passing of Adjustment Memos & Advice of Transfer Debits.

(13) Passing of wages to labourers employed on Muster Roll.

(14) Stock Accounts.

(15) Tools and Plant Accounts.

(16) Monthly Accounts.

(17) Maintenance of initial records *e.g.*, Contractors' Ledger, Register of Purchases, Deposits, etc.

(18) Monthly Returns.

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APPENDIX XVIII

Flow chart showing the process of adjustment of debits passed on by the D. G. S. & D.

Existing Procedure

1	2	3	4	5	6
Receipt of Inspection Notes, Receipt certificates from the consignee.	Payments made by the Accounts Officer of the D. G. S. & D.	Settlement Account with the A.G. of the consignee.	Sorting of various Vrs. etc. by the A. G. of the consignee.	Adjustment under P. W. Remittances by the A. G. of the consignee.	Advice to the Divisional office for adjustment in Divisional Accounts.

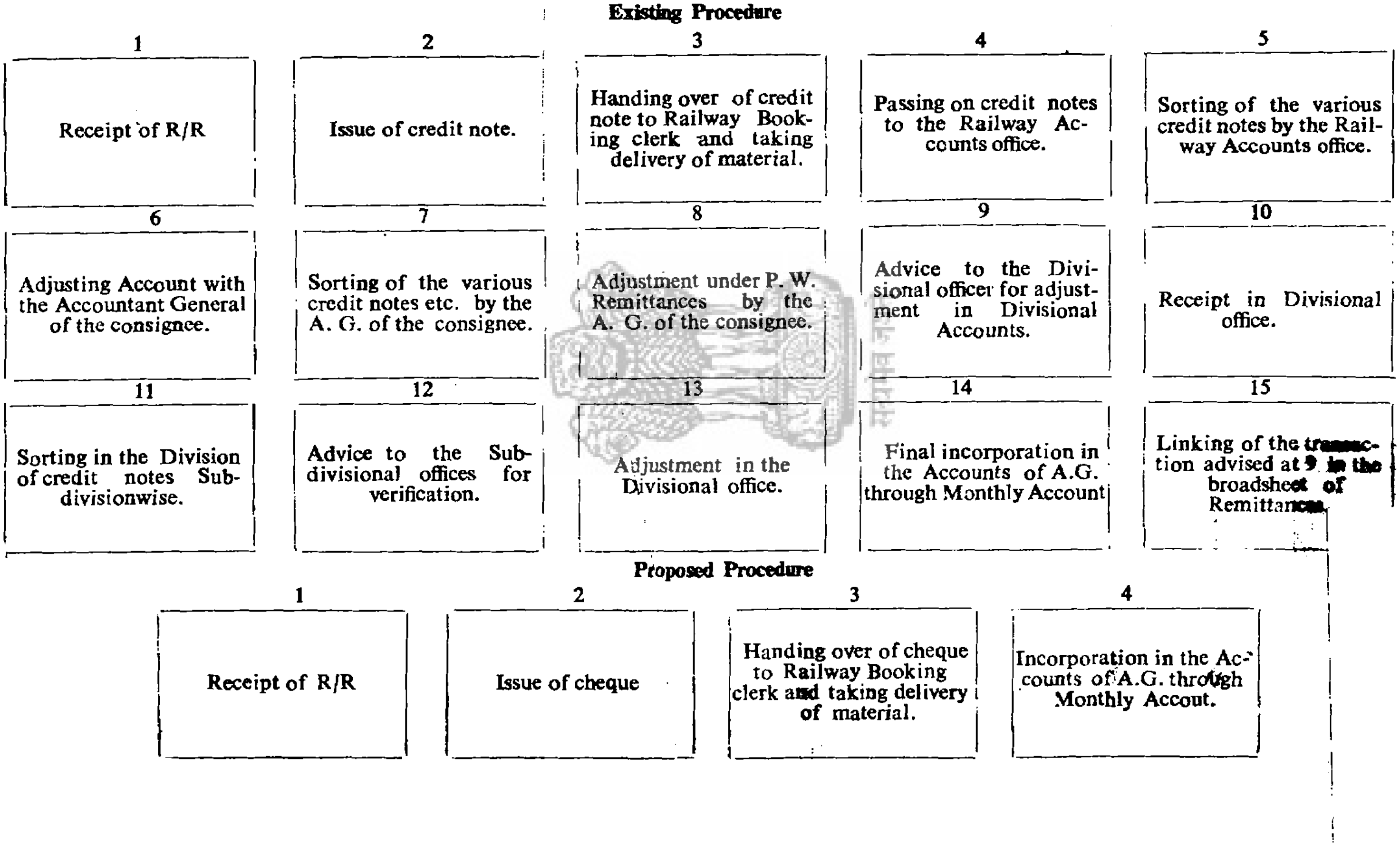
7	8	9	10	11	12
Receipt in the Divisional office.	Sorting in the Division of vouchers sub-divisionwise.	Advice to the Sub-divisional offices for verification with the initial record *e. g.* M. B. etc.	Adjustment in the Divisional office ,ter verification.	Final incorporation in the Accounts of A. G. through Monthly Accounts.	Linking up of the transactions advised at 6 in the Broadsheet of Remittances.

Proposed Procedure

1	2	3	4	5	6
Receipt of Material & Bill from the suppliers.	Recording of entries in the Goods Received Sheets.	Checking of the Bill by the A. E.,	Checking & passing of Bill in the Divisional office	Issue of cheque.	Incorporation in the Accounts of A. G. through Monthly Account submitted by the Division.

APPENDIX XIX

Flow chart showing the Process of Payment & Adjustment of Railway Freight


Existing Procedure
1
Receipt of R/R
2
Issue of credit note.
3
Handing over of credit note to Railway Booking clerk and taking delivery of material.
4
Passing on credit notes to the Railway Accounts office.
5
Sorting of the various credit notes by the Railway Accounts office.
6
Adjusting Account with the Accountant General of the consignee.
7
Sorting of the various credit notes etc. by the A. G. of the consignee.
8
Adjustment under P. W. Remittances by the A. G. of the consignee.
9
Advice to the Divisional officer for adjustment in Divisional Accounts.
10
Receipt in Divisional office.
11
Sorting in the Division of credit notes Subdivisionwise.
12
Advice to the Subdivisional offices for verification.
13
Adjustment in the Divisional office.
14
Final incorporation in the Accounts of A.G. through Monthly Account
15
Linking of the transaction advised at 9 in the broadsheet of Remittances.
Proposed Procedure
1
Receipt of R/R
2
Issue of cheque
3
Handing over of cheque to Railway Booking clerk and taking delivery of material.
4
Incorporation in the Accounts of A.G. through Monthly Accout.